

BETTER HEALTHCARE *through* TELE-HEALTH

Editors

Hameed A. Khan
M.M. Qurashi
Irfan Hayee



January 2008



Commission on Science and Technology for
Sustainable Development in the South

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FOREWORD

Like other global inequalities in terms of food security, access to safe water as well as knowledge and information critical for day-to-day life and livelihood, provision of healthcare is marked by a persistent disparity. This is especially true in the case of access to healthcare services. Developing countries are going through a dire health crisis whereby millions of people are underserved in the wake of deficiencies in basic healthcare facilities, access to accurate and timely healthcare, scarce number of health professionals, inadequate health education and awareness, and out of date clinical procedures.

With the emergence of information technologies (IT) in the last century, there has been a growing interest in the role of IT for sustainable healthcare delivery mechanisms. Modern information and communication technologies (ICTs) have been identified as the key components in improving healthcare, and these hold a primary significance in achieving the Millennium Development Goals (MDGs). ICTs have the potential to help improve the standard of health by delivering healthcare information to the healthcare communities, and services to the end-users in developing countries.

Pak-US collaboration in science and technology created the opportunity of training Pakistani doctors in telemedicine applications at state of the art Telemedicine centres of USA in 2003. The idea was to acquire these technologies so that they can be customized to the needs of Pakistan and to produce master trainers for building a human resource in this particular field. Telemedicine/e-health training project was a further continuation of this program in which a model Telemedicine Centre was established at Holy Family Hospital and was linked to a remote hospital in Pindi Gheb. This six months pilot project of US\$ 100 thousand worked as the training ground for medical professionals, and 45 doctors and nurses from Rawalpindi/Islamabad got training in telemedicine applications and are now pursuing telemedicine solutions in their own institutions. Moreover the Centre has conducted telemedicine training of hemophilia patients and paraplegics of earthquake. This Centre was identified as the only Telemedicine Centre in Pakistan to provide medical services through telemedicine in the Asian earthquake of 2005. The Centre has organized 4th APT Telemedicine Workshop in Rawalpindi and has continual collaboration with research institutes of USA, UK, India, Japan and Canada. After the pilot project, a recently approved

project under Pak-US collaboration program is conducting telemedicine training at national level and will provide tele-rehabilitation to earthquake paraplegics of Muzaffarabad.

While considering the role of ICTs in the area of healthcare, however, there are many operational, technological, infrastructural, and financial challenges. Above all, we tend to overlook the real needs of the beneficiaries, which vary greatly due to social, cultural and educational differences. To meet these challenges, the efficient use of clinical and technological resources must be optimized and relevant informational resources and the technologies to deliver it must be effectively channelized. The key is to intelligently use modern day technologies to address specific problems and improve on existing ways of working. The full benefit of information technologies will only be apparent when these meet the real needs and add value to the delivery of healthcare services. It is indeed satisfying to note that COMSATS has been one of the first and very few organizations that took an initiative to alleviate and address the problems of healthcare delivery to rural and remote communities of Pakistan through ICTs.

There are many challenges that are yet to be overcome to change the face of healthcare delivery systems in Pakistan, though the pioneering efforts of COMSATS in the field of telehealth are worthy of mention and serve as a benchmark to others working in the field. This publication is a good effort on the part of COMSATS to present the technical talks delivered at the Seminar on Telehealth, organized by COMSATS on 21st August, 2007, and it presents the views and ideas of subject-experts from the field of healthcare. Generally, it discusses issues that are critical to health and useful strategies through which the developing world can benefit from ICTs in the healthcare arena. I am pleased to note that this book talks about the above stated issues in a very balanced and effective manner.

I recommend this book to governmental and non-governmental officials who keep an eye on healthcare sector and healthcare professionals, including doctors, clinicians, paramedics, as well as medical students. I hope this book will surely encourage and coordinate telehealth development within the developing countries. At the same time I suggest people from other walks of life to read this book as a source to increase their learning and knowledge about telehealth in general.

Finally, I would like to appreciate the efforts of COMSATS' entire team working under the guidance of Dr. Hameed Ahmed Khan, the Executive Director COMSATS, for their bountiful efforts in the developmental sector and wish them all the success in their future endeavors.

Prof. Dr. Atta-ur-Rahman, FRS
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Higher Education Commission &
Advisor to the Prime Minister

PREFACE

The basic objective of sustainable human development, as we know it, is to create an enabling environment for people in terms of quality of health, education and standard of living. This objective, however, is usually pushed aside, particularly in developing countries, in favor of other immediate concerns such as the accumulation of commodities and financial wealth. The fact that health has an important role in enhancing productive capacities that help in accelerating the process of development is generally overlooked. The South, comprising many developing countries and having a quarter of the world's population, is therefore, marked by a weak healthcare-system, and a staggering burden of diseases.

Developing countries around the world share common challenges in healthcare. Fortunately, technology as well as patient and professional acceptance have started to reach levels where telehealth offers a practical and effective solution for delivering healthcare services to people in remote and isolated areas. Until quite recently, telehealth was a relatively new concept, as far as most developing countries were concerned. Today, technology has enabled providers of healthcare to readily share data, images, expertise, and diagnostic procedures, through extensive use of diagnostic equipment, together with multimedia, and videoconferencing capabilities, so that telehealth is no longer an unfamiliar phenomenon. Recent advances in information technology and telecommunications have made telehealth both affordable and feasible. As a result, telehealth has been recognized as a tool that holds the promise to provide equitable access to timely, efficient, and quality healthcare and health information.

Keeping in view the poor state of healthcare in the Northern Areas of Pakistan, COMSATS took the initiative of launching telehealth services in the Northern Areas. A project with the name 'ICTs for Rural Development of Remote and Mountainous Areas of Northern Pakistan', was initiated in January 2004. Its overall objective was to facilitate activities for alleviation of poverty, improve access to specialized health services and IT education and, thereby, contribute towards raising the standard of living in the focused communities, through action-research in the application of ICTs.

Baltistan Health and Education Foundation (BHEF) founded in 1990, has been working to mobilize healthcare services for women in the remote and backward regions of Baltistan. The foundation collaborated with COMSATS to implement and make the first such project in the area a success. International Development Research Centre (IDRC); the Crown Corporation is the principal

funding organization. Introduction of telehealth services in the Northern Areas of Pakistan has provided a breakthrough to a large section of the population through provision of healthcare.

A major concern of the developing countries, however, is to make smart choices and invest wisely in the future use of telehealth, in view of the continued fiscal and human resource constraints on healthcare, in this highly competitive world. Factors such as to determine the impacts, benefits and limitations of telehealth, as well as to devise cost-effective and community-specific programs of telehealth, are other important issues. It was in this background that COMSATS organized a one-day seminar on telehealth in August, 2007, to discuss current trends in telehealth and to propose effective solutions for the future of telehealth in Pakistan. Ultimately the mission of this Seminar was to understand how new technologies could be appropriately employed to improve health in the country. The aim was to learn both from projects now underway and past experiences, with an eye to developing new approaches and initiatives.

Key experts belonging to diverse fields, including health and IT, from across the country participated in the seminar to make it a success. This book is a compilation of the various papers presented during the seminar.

This book is an effort on COMSATS' part to disseminate information and experiences related to telehealth, particularly in various policy-making, healthcare-providing and development circles, and to create awareness regarding telehealth, in general. I am hopeful that this book will help in improved understanding and addressing of health-related issues, through easier and more flexible healthcare-services and support.

I am confident that this publication will prove to be worth every reader's time and attention and will encourage COMSATS to bring out even better and useful publications in future as well. Lastly, I am thankful to all the esteemed authors who have contributed papers in this book, and also to COMSATS' competent team especially Dr. M.M Qurashi, Mr. Irfan Hayee, Dr. Azeema Farid, Mr. Imran Chaudhry, and Ms. Sadia Nawaz for their efforts in compiling, editing and publishing this book.

Dr. Hameed Ahmed Khan, H.I., S.I.
Executive Director – COMSATS

SECTION-A

**HEALTH-POLICY
ISSUES & OPTIONS**

SUSTAINABILITY IN HEALTH AS A POLICY- ISSUE IN PAKISTAN

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ABSTRACT

The notion of 'sustainable development' attempts to create a synthesis of development for conserving economic, natural, environmental or social resources. Pakistan's economy is no exemption to resource scarcity. However, the problem is of missed opportunities, where periods of rapid economic growth in Pakistan were not translated into equally compatible human/ social development.

Pakistan's health sector is striving to improve health outcomes, not only in terms of improvement in the macro-level indicators, but in terms of improvement in access and utilization of healthcare services. Sustainability in health demands that access to healthcare facilities/services is not limited to those with access to resources. Everyone, without exception, should have access to knowledge and information that they need to have a healthy and productive life.

Sustainability in healthcare arena calls for maintaining good health within the scarce resources, that should result in increasing efficiency in attaining good health. Tele-health is a modern way of delivering cost-effective health services and its potential for increasing access to adequate healthcare, despite the distances being great. However, there are issues of outreach, regional differences in healthcare, and delivery. Acceptance by patients and providers of tele-health versus traditional healthcare systems is a challenge. Other problems relate to health related information-technology infrastructure in the country, patients' privacy and a more coordinated health policy that reinforces the use of tele-health as a new mode of healthcare service-delivery.

1. HEALTH, SUSTAINABILITY, SUSTAINABLE DEVELOPMENT

1.1 Concept/ Relevance

Sustainable development is interpreted in various ways. According to

Holmberg and Sandbrook (1992), more than seventy definitions of sustainable development are now currently in use. Pearce et al (1989) include a “gallery of definitions” of sustainable development as an appendix to their book. However, the most widely quoted definition and effectively used as an official one is that of Brundtland (1987) which states that “sustainable development meets the needs of the present, without compromising the ability of the future generations to meet their own needs”. Sustainability in health implies attaining efficiency (maximizing health-output for given amount of resources) and minimizing wasteful use of resources and healthcare costs. The focus on health as central to concerns on economic development was repeatedly stressed by the United Nations Conference on the Environment and Development (UNCED) in Rio de Janeiro in 1992 (UNCED 1992). The outcome program on sustainable development for the 21st century, Agenda 21, referred to health more than two hundred times. Sustainability has various dimensions, economic, environmental and social. For improving health-outcomes, all these relations need to be explored in an interconnected manner.

1.2 Linkages with Other Sectors

In the context of the health-sector, the term “sustainability” is interlinked with development taking place in other sectors of the economy. Developmental activities taking place in an economy’s major sectors, for example, agriculture (food and livelihoods), industry, transport, and education, are directly or indirectly related to health in a multi-causal fashion. For example, an increase in the levels of education is associated with more awareness concerning health-related matters and results in better health-outcome. Similarly, an increase in healthy food-consumption and better medical care result in better health states. When the economy grows, there is an increase in productivity and income that enable people to invest in activities that improve health. For example, with increase in income, people are able to give more attention healthcare, in case of need. Therefore, any changes or developments that take place in these sectors, directly or indirectly affect the population’s health.

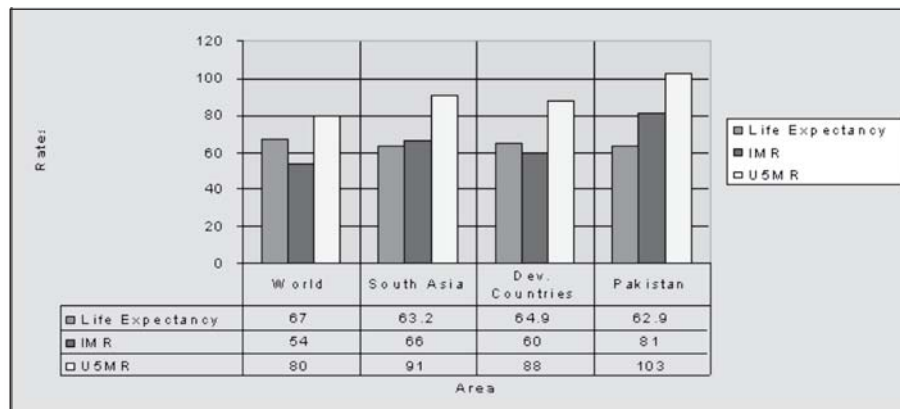
In the past few decades, Pakistan experienced periods of rapid economic growth, but “missed opportunities” to transform this economic development into equally compatible human and social development. Economic growth reduces poverty and enables households to spend more on activities that enhance human development. However, when the fruits of economic productivity and growth are not shared at the grass-root level, then it is very difficult to conclude that a country is making progress or that development is

taking place in its true sense. Under this vision of sustainable development, it is now widely agreed that human health developments should take place simultaneously with the overall development. It is not correct to advocate that economic development should take place independently of human development; they should go hand in hand with each other by incorporating health-sector developments as a cross-cutting theme in the other sectors of the economy. Thus, health-sector development does not take place as a 'stand alone' activity, but health is interlinked to the developmental activities taking place in the other sectors of the economy. As the concept of 'health sustainability' is multidimensional, one dimension is to address the health-issues from an environmental point of view. United Nations Agenda 21 (1992) provides importance to health-issues by strengthening the role of health-authorities in protecting and promoting human health. It states that "human beings are the centre of concerns for sustainable development. They are entitled to a healthy and productive life, in harmony with nature". In Pakistan, from an environmental point of view, certain regions are more vulnerable due to fluctuations in rainfall, temperature and water-availability that directly affect health-security. Also, rapid urbanization is posing the threat of health management in the peri-urban regions. From an economic point of view, the term "sustainability" implies attaining efficiency, saving on scarce resources, and minimizing the wasteful use of resources. With increase in income and economic growth, the number of persons living below the poverty-line can be reduced and households can spend more on health-related activities and increase productivity of labor. However, whatever the dimension of sustainability for health maybe, "pro-poor" health-development policies should acknowledge the fact that to promote health, diversified health-infrastructure, adequate funding for health, and strong public-sector support are important prerequisites.

Table - 1: Pakistan's Macro and Micro-Level Health Indicators

Infant Mortality Rate (IMR: Males)	78.0
Females	74.3 / 1000 lb
Under-Five Mortality-Rate U5MR	90/1000 live births
Maternal Mortality-Ratio (MMR)	500/100,000 live births
% of women using antenatal care	43%
Total Fertility Rate (TFR)	5.1
% of women suffering from Anemia	23%
Pakistan's health index rank	147

Source: *Human Conditions Report (2003), Pakistan Demographic Survey (2003), Economic Survey of Pakistan (2005),*



Source: World Development Report

Figure - 1: Comparative Health Indicators and Pakistan

1.3 Instances of Failure and Need for Synthesis

The goals of attaining economic efficiency and minimizing waste in the health-sector are not easy to attain. Since the second World War, many efforts have been undertaken to improve the living conditions of the South, (where more than one third of the world’s population resides) but for many decades, little success has been achieved, in terms of reductions in poverty and improvement in the overall living-standards in terms of better education and health. Dumont (1988) catalogues the failures of development where the human race remained under class, with people living on the edge of survival, death and disease. Dumont discusses in detail how living conditions of many in the developing countries are disturbing for the notion of “equity and social justice”. Dumont (1988) presents a notion of ‘sustainable development’ that creates a synthesis of developmental needs. He advocates to save on resources (social, economic, environmental.) by explicitly incorporating the goals of social justice and equity in the overall developmental framework. In this manner, a concept of ‘sustainable human development” emerges that lays stress on inter linkages between health and development. A “synthesis of development” therefore, puts emphasis on conserving resources, on the one hand, and incorporating health issues in the overall development, on the other hand. In Pakistan, there are a number of factors that prevent this from happening. For example, instabilities in the country’s socio-economics have hampered overall economic growth. Similarly, imperfections in the market prevented the economy from attaining efficiency, and led to waste of resources. Unequal distributions of resources available for health highlight the issues of affordability. The Household Income

and Expenditure Surveys (HIES), published by the Federal Bureau of Statistics show wide disparity in incomes. However, equity in health-studies are not well documented, so that the exact extent of inequality in health is not known. Pakistan's healthcare system is skewed towards curative aspects, rather than preventive aspects. As a result, health-services are usually afforded by those who have access to resources and have the capacity to pay, thus leaving the poor and most vulnerable in the vicious circle of poverty, hunger and disease. Therefore, the notion of synergies, where investment in one social sector, for example education, brings about positive changes in health, becomes central to reducing hunger and disease and enhances human development, see HDR (2003, pp85).

2. PAKISTAN'S HEALTH-SYSTEM AND POLICIES

Although, health is increasingly becoming a priority area for the government, a number of inadequacies remain within the system, resulting in undesirable health-outcomes. Among other factors, these include, unhygienic living conditions, lack of basic health-services, scarcity of clean water, lack of resources to meet recurring expenditure in the health system, and poverty that results in malnutrition, mostly among children and women.

2.1 Pakistan's Health Indicators

Table-1 shows Pakistan's major health indicators.

Pakistan's macro-level indicators present a bleak picture of the health-system, not to talk of the micro-level indicators, for which no national level-data are available. Infant and child mortality remain high, despite efforts to reduce mortality, highlighting the fact that the underlying causes of mortality have not been addressed. Shehzad (2004) finds that, while decomposing factors responsible for reductions in mortality, the effect of maternal education turns out to be more important than income and works through ability to process information about healthcare during child sickness. This finding points out that any investments that take place in the educational sector for promoting education, can indirectly bring reductions in mortality and promote preference for a small size of family.

To improve on these health-indicators, the health-sector is currently focusing on the following major programs, (i) National Program for Family Planning and Primary Healthcare (ii) Expanded Program of Immunization(iii) National

Table-2: Development and Non-Development Component as % of Total Expenditure on Health (Rs in Millions)

Year	Development	Non-Development	Total
2002-2003	6609	22205	28814
% of total health	22.9%	77.1%	100%
2003-2004	8500	24305	32805
% of total health	25.9%	74.0%	100%
2004-2005	11000	27000	38000
% of total health	28.9%	71.0%	100%
2005-06	16000	24000	40000
% of total health	40%	60%	100%
2006-07	20000	30000	50000
% of total health	40%	60%	100%

Source: *Inventory of health and population investment in Pakistan, Planning Commission (2005, pp. 5)*

AIDS Program (iv) Malaria Control Program (v) T.B Control Program (vi) Women Health Project (vii) Cancer Treatment Program (viii) Food and Nutrition. However, these programs do not cover all areas needed for improving the population's health. Other integrated efforts are also needed that can improve health. Some of these measures include poverty-reduction programs, process of devolution, and participation in efforts for achieving Millennium Development Goals (MDGs) set by the United Nations.

2.2 Expenditure on Health

For health and health-services to be sustainable, resources allocated for health play an important role. Pakistan is not a rich country; therefore, resources allocated for health are not enough to meet the needs of all. Total expenditure on health, at both the federal and provincial levels, as presented in Table-2 shows that non-development expenditure constitutes more than seventy percent of the total resources allocated for health. Although, the government's overall expenditure on health sector increased from Rs 28.18 billion in 2001-02, to Rs 38.0 billion in 2004/05, the expenditure nevertheless remains a small fraction of gross domestic product (GDP). This resource-allocation is apparently not enough to meet major healthcare related goals set for improving health.

2.3 Pakistan's Health-Policies

The health-policies are considered to be a reflection of the prevailing practices of the health-sector. Pakistan's health-policies are therefore, expressed via series of services provided in the health-sector, stipulating certain procedures that are the result of decisions about how tasks will be performed over a specified period of time. The policies therefore, can be evaluated not only for past performances, but for setting future goals. In Pakistan, health-policy studies remained neglected for most part of the country's history. Therefore, there are differing views about the usability/ characteristics of these policy-documents. Some of the significant reasons why these policies were not consistent in content and impact were relatively less amount of evidence-based research work and effort put in the health-policy formulations. For health-policy evaluations, most commonly used criteria include (i) adequate health documentation (ii) health impacts, and (iii) health- impact assessment. According to these criteria, health-documentation was carried out mostly in terms of five-year plans that remained strong instruments for health-policy planning in Pakistan.

Table - 3(a): Comparative Picture of Pakistan's Major Health-Policies

1990	1997	2001
<ul style="list-style-type: none"> • Provision of universal primary health care. • Universal Immunization • Increase in health care personnel (doctors, nurses, paramedics) • Measures to enhance nutritional status of children. • Reduce IMR to 50/1000 LB • Increase life expectancy over sixty years. • Increase resources available for health as a percentage of GNP. 	<ul style="list-style-type: none"> • Reduce IMR to 40/1000 LB by year 2003. • Reduce MMR from 350/100,000 to 200 in 2003 • Increase life expectancy to 65 years in 2003. • Increase immunization coverage. • Increase number of health care personnel (upto 70%) in 2003. • Increase health human resources including doctors, nurses, dentists, skilled birth attendants. 	<ul style="list-style-type: none"> • Immunization coverage to increase upto 80% by 2005. • Significant reductions to be achieved in TB, polio, Hepatitis B and Malaria cases. • Family health workers to increase to 100,000 by year 2005 • Upgradation of health care facilities. • Reduction in IMR, MMR, U5MR, neonatal mortality rates and increase in life expectancy.

Source: Ministry of Health, Policy Documents (Various years). Note: No policy met the required targets

However, the 1990 health-policy document can be regarded as Pakistan's first health-policy that included certain health proposals, having potential implications for primary healthcare (PHC), mother and child healthcare (MCH) management-information system (MIS) as the focal areas of research. It was a well researched document that covered many areas of the health-sector and provided an understanding of the problems in general. However, this policy lacked an empirical account of the past, and ignored implications as a result of what specifically happened in the 1980s. The second health-policy was prepared in 1997 and was introduced at a time when Social Action Plan (SAP-1) had already been implemented and SAP-II was on its way. This policy, in contrast to the one carried out in the 1990, discussed past progress and

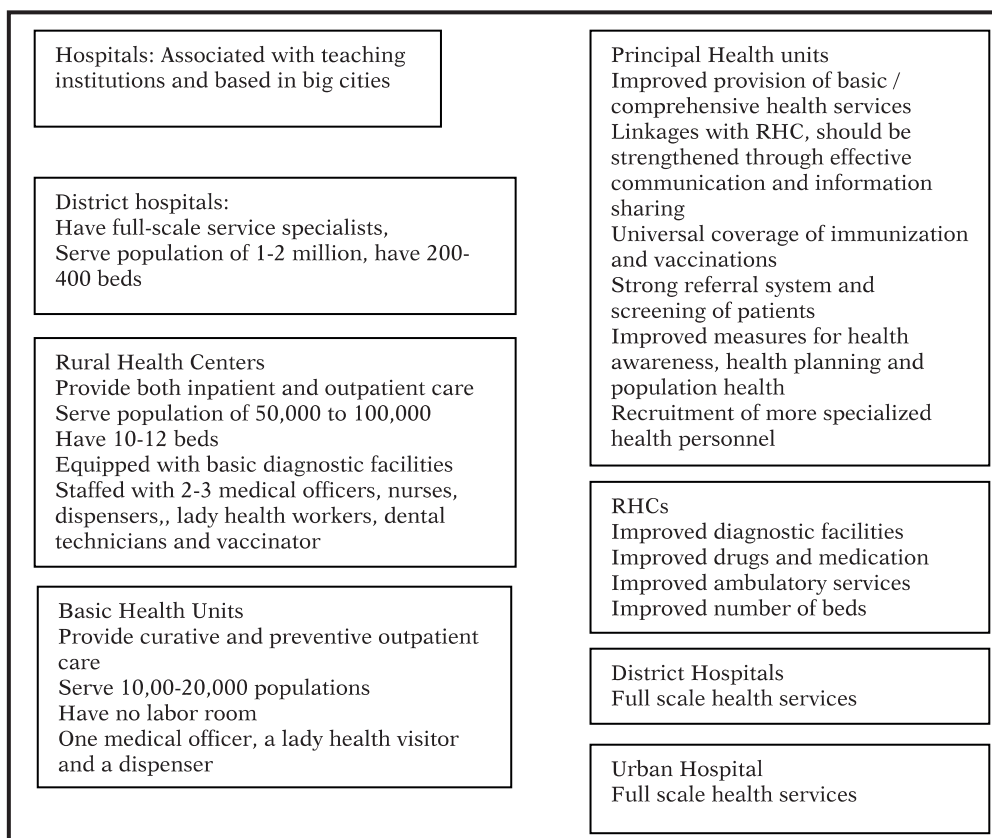
Table - 3(b): Population Characteristics and Healthcare Needs

Population Distribution (1998) Census data	Population health needs	Suggested Measures	Proposed changes in policy
<ul style="list-style-type: none"> • Age strata (Population figures reported in 000 nos.) • 0-15 (Children) • Total population: (56,056) • 15-59: Total population: (65948) • 65- above (Elderly) (7162) • Total Population: (132,352) • Gender: Male: 68873 Female: 63478 • Urban : 42458 • Rural : 88121 	<ul style="list-style-type: none"> • Universal immunization • Control of communicable/ non-communicable diseases • Prevention and treatment options. • Improved nutritional status • Universal access to full scale health care services. • Financial support for those who can not afford to pay for services. • Greater community involvement in provision of health care services. 	<ul style="list-style-type: none"> • Target setting to meet health care needs of Pakistan's population • Short term milestones linked to long term goals. • Continuous process of health status improvement • Removing inequity/ inequality in access to health and health care. • Fair distribution of resources of health. • Minimize waste of resources, improve efficiency. 	<ul style="list-style-type: none"> • Gathering evidence before design of health policy • Realizing constraints and reallocation of resources. • Gender sensitive policies. • Decentralization of decision making for addressing community health issues. • Strong health referral system • Removing gaps in access to health care across gender, area, and region. • Improvement in implementation of policies through better monitoring and evaluation

Source: Population Census data 1998

provided figures about health-status and health expenditures. It suggested a program of Basic Minimum Needs for development, but cost-effectiveness of alternate strategies was not discussed that made it hard to establish. There were also issues relating to need assessment based on the actual empirical evidence. However, this Social Action Plan (SAP), which received huge grants from the World Bank, did not achieve any of the outcome targets in the health-sector due to management issues and lack of community-level involvement. Later on, the government announced another health-policy in December 2001. This document was a broad statement about ten key areas, but did not contain discussion about past health-policies. It was based on data-analysis that formed the base for health priorities. However, the stated targets appeared to be over ambitious, as cost-effectiveness of different healthcare programs was not carried out.

Box - 1: Pakistan's current and proposed Health Services Delivery System



Source: *The Centre for Reproductive Rights 2004*

Box - 2: Health-Related Millennium Development Goals

Goals	Targets	Indicators
Eradicate extreme poverty and hunger	Halve the proportion of people suffering from hunger	Prevalence of underweight children Population below minimum level of dietary energy consumption
Reduce child mortality	Reduce by two-thirds of under five mortality rates	Under five mortality, infant mortality, and proportion of 1-year children immunized against measles.
Improve maternal health	Reduce maternal mortality ratio by three quarters	Maternal mortality ratio, proportion of births attended by skilled health personnel
Combat HIV/AIDS, malaria and other diseases	Halve halted by 2015 and reverse the spread of HIV/AIDS, malaria and other diseases.	HIV prevalence among 15-24 years, contraceptive prevalence rate, number of children orphaned by HIV/AIDS Prevalence and death rate associated with malaria, proportion of population in malaria risk areas, prevalence and death rates associated with TB, proportion of TB detected and cured under DOTS.
Improve global partnership for development	Provide access to affordable essential drugs in developing countries	Proportion of population with access to affordable essential drugs on a sustainable basis.

Source: *Human Development Report (2003)*

Pakistan's overall health-system shows that relatively more emphasis is placed on curative, rather than preventive health practices. In view of this fact, public spending on health has remained less than one per cent of GDP, a bias in urban/rural curative practices leads to differential health utilization across different income groups. What adds further to deterioration in the health-status is the fact that there are issues of uneven public and private service quality under a weak regulatory framework that does not differentiate between profiteering and social justice for health. Over the past many years, Pakistan has been struggling to eradicate poverty; however, due to multi-causality of factors, the masses of population continue to suffer from adverse socio-economic conditions. Besides poor macro and micro health-indicators, the burden of diseases is another problem, whose incidence mostly falls on the poor. In Pakistan, communicable diseases account for 49% and non-communicable diseases account for 41% of the burden of disease in the country (HCR 2004, pp. 180). Injuries account for the remaining 10% of the disease-burden (GOP 2001). An analysis of the burden of disease in Pakistan

Box - 3: Setting Local Targets in the Light of Global Objectives

Millennium Development Goals	Pakistan's Current indicators	Proposed targets-Stage 1 (2007-2011) Stage 2 (2011-2015)	Outcome and Sustainable route (2015)
Eradicate extreme poverty and hunger	23.9% population lives below the calories based food plus non food poverty line (2004-05) 30% of population lives below minimum level of dietary energy consumption (2000-01).	Take out 12% of the population living below food and non-food poverty line. Repeat target for the second stage. Improve nutritional status of 15% of target population. Repeat target for the next phase.	0% of population living below calories based or dietary energy consumption poverty line. Provide social protection to below PL population (state responsibility). Specific programs for community empowerment, education, health awareness, employment generation should be initiated and implemented.
Reduce child mortality	Neonatal mortality rate (43.1%) in 2003 IMR (74.6) in 2006 Child mortality rate (107.4) in 2006. Low birth babies (33.0%) in 1999 Immunization (77%) in 2004-05.	10% reduction in neonatal mortality rates, IMR, U5MR. Reduce number of low birth babies by atleast 10%/ 10% increase in immunization coverage. Repeat targets for the second stage.	Reduction in mortality rates by half by year 2015. Incorporate health as a cross cutting theme in education, population, welfare policies. Improve resource availability for the very poor. Target oriented approach for reductions in mortality. Reduce TFR by encouraging preference for a small family size. Reduce the number of unwanted pregnancies through effective family planning. Regulate monitoring, evaluation and central reporting of statistics.
Improve maternal health	MMR 350/100,000 live births in year 2002	Reduce MMR to 300/100,00 over a period of four years. Further reduce MMR to 250/100,000 LB.	MMR reduction to 250/100,000 LB Increase awareness for safe motherhood Increase EMOC as a tool for reductions in maternal mortality. Increase education and provide societal support for safe pregnancy.

continue...

...continued

			Increase immunization, improve nutritional status and safe deliveries.
Combat HIV/AIDS, malaria and other diseases	85,000 number of HIV/AIDS cases (2005) Malaria blood slides (2.67%) per total population of the area *100, (2006) TB (62%) all types of cases identified (2006).	Reduce number of additional HIV/AIDS cases, Malaria cases, TB cases by half. Repeat targets for the second phase.	Reduce the incidence of deadly diseases. Increase knowledge about HIV/AIDS Reduce transmission through pregnancies. Target high-risk districts for malaria control. Reduce accurate reporting of malaria tests. Improve case detection for TB.
Improve global partnership for development	431 number of pharmaceutical companies having 21.12 billion of investment. Share of MNC is 47% all data (2003). Share of local companies is 57%.	--	Introduce evidence based regulatory interventions. Overcome shortage of essential drugs. Control drug pricing through effective regulation. Prohibit unethical practices in marketing according to the Drugs Act 1976.

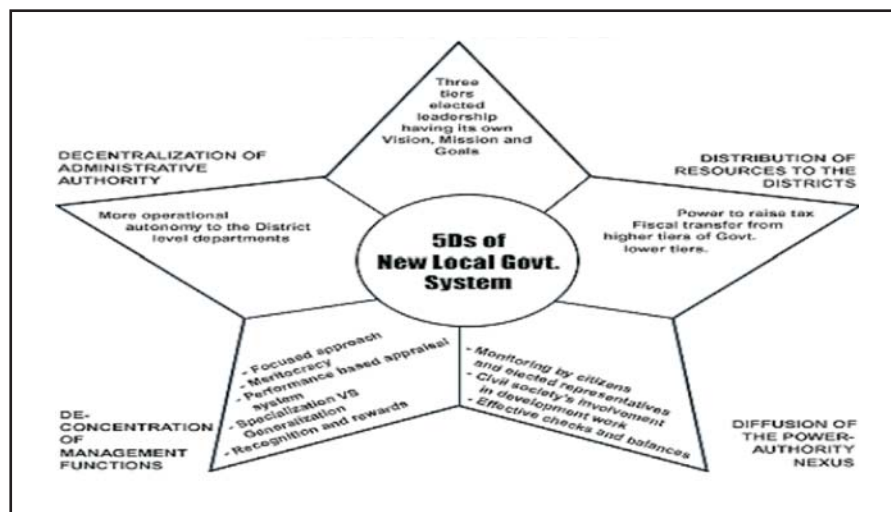
Sources: Government of Pakistan, PRSP, Ministry of Finance, 2002
Government of Pakistan: Pakistan Demographic Surveys, Federal Bureau of Statistics, Various Issues. Govt. of Pakistan, Directorates of TB, Malaria, HIV/AIDS Control, 2006
Government of Pakistan, National Program on EPI, 2006 National Surveillance Cell, EPI, Ministry of Health Heartfile: Gateway Paper 1

indicates that such burdens are mostly borne by the poor and the more vulnerable groups. The achieving of the millennium development goals is one yardstick that informs on how well our macro-level health indicators are performing. However, it is not only enough to improve on macro-level health indicators, but we should aim for improving Pakistan's micro-level health indicators and general quality of life.

For this purpose, public health systems and governing bodies of health can ensure the delivery of essential public-health services. The issues need to be addressed at local, federal and provincial levels for health-system

performance assessment in two stages (i) an evaluation of already existing health standards in Pakistan, (ii) development of instruments for health-system performance assessment, to ensure provision of quality at all health levels. Through a comprehensive health-policy, measures for health-protection can be proposed. The health policy should try to integrate other sectors of the economy to improve the health-conditions and shift the focus of regulatory control from low-risk to high-risk areas. Efforts to improve inter-sectoral approaches can lead to harmonization of strategies at all levels and they can be important for economic, environmental, and social dimensions of sustainable health-development, made possible through engagement of all stakeholders. The United Nations Earth Summit held in Rio de Janerio (Brazil, 1992) presents a guiding document for all nations in the world with a common philosophy “think globally, act locally”. For health to be sustainable and to be able to meet the Millennium Development Goals, it is therefore a wise strategy to set local targets, because so far Pakistan is no where even near to meeting the MDGs. However, by setting realistic short-term milestones, significant success can be achieved in reducing mortality and improving the health-outcomes. The following box shows the pattern of health-services delivery in Pakistan, followed by MDG goals and indicators and a reflection on where Pakistan stands to meet these goals.

Despite government’s efforts to improve the health-status of its people, Pakistan’s health-indicators remain far behind those in the other developing



Source: www.nrb.gov.pk/local_government/figure_1.gif

Figure - 2: Devolution of Political Power

countries. Health- expenditures remain below one percent of total GDP, reflecting that public-sector expenditure on health is not enough to meet the health-care needs of all in the country. Demographic indicators and trends over the past many decades reflect on the productive capacity of the population. Recent demographic dynamics show that, in Pakistan, the proportion of population belonging to the working class is highest, due to which, Pakistan can reap the economic benefits of increased productivity. However, in the coming years, this trend will change and the proportion of the elderly will be more than the younger population, thus reflecting on the need for changing healthcare needs in the near future. The changing healthcare needs and apparent inequalities in the system can lead to distribution of resources for health that is not just and fair. This resource inequality in health and income is compounded by other factors in the country, such as water-scarcity, infertility of land in different parts of the country, environmental degradation, and unjust social set up that affect the status of health. Other issues, like, congestion, over-crowding, and pollution, also need to be emphasized to minimize their adverse impacts on health, especially for the vulnerable groups, such as women and children. Due to economic and environmental stress, a direct impact on population health and their livelihoods is observed. A very high population growth-rate impacts the environment through increased levels of consumption of resources (renewable and non-renewable).

In Pakistan, there are no exact calculations about the demand for resources for health, food, clothing, heating, and housing. It is also very difficult to find out per-capita availability of health-resources and the gap that exists between demand and supply for health and healthcare. Therefore, in presence of

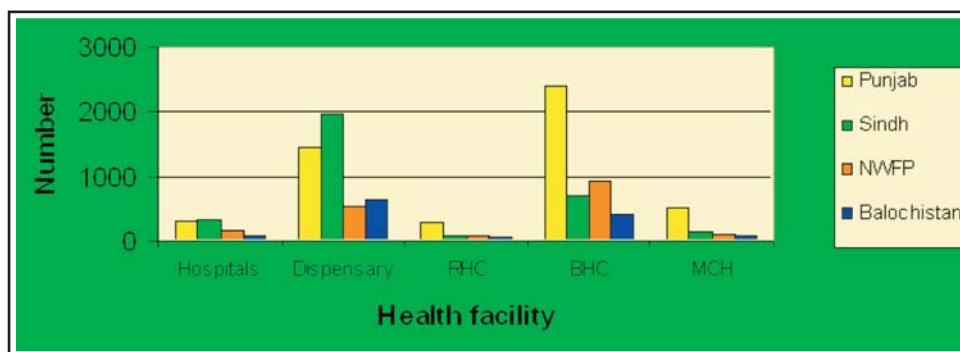
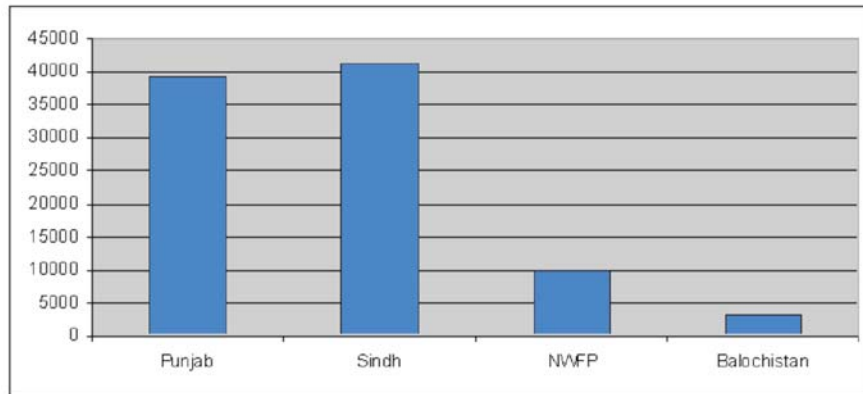
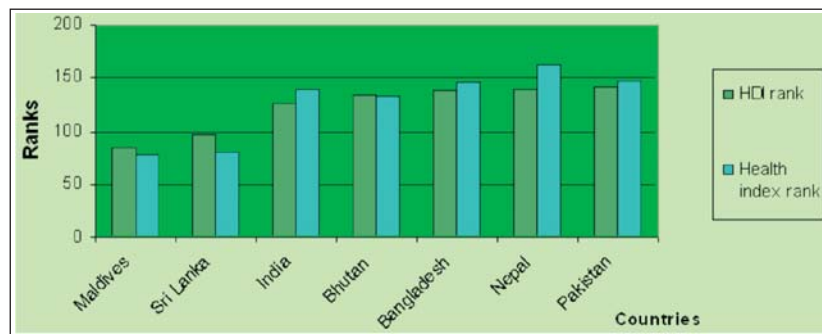


Figure - 3: Health Facilities by Province (2001)



Source: Annual Report of the Director General of Health (2000-01).

Figure - 4: Total number of doctors across provinces



Source: World Development Report (2004)

Figure - 5: Health and Human Development Ranks

factors like rapid urbanization, high fertility-rate, greater internal migration, that create pressure on health-infrastructure, the possible environment consequences can not be avoided and conservation of resources becomes far more crucial. Therefore, it is important to bridge the gap in health-services delivery, to ensure equitable access to health for all. Another major factor that is important for improving the performance of the health-system is cost containment. If the health sector can ensure that all available resources are being used efficiently, the costs can be curtailed, not only for the patients, but for the Ministry of health and the society as a whole. One special case is the use of telehealth/ information technology (in the health sector) that can enhance the capacity to monitor and protect public-health through better health-surveillance. Use of information-technology can help in preventing the spread of chronic non-communicable and communicable diseases. Similarly, the

public can be better informed by high-quality health-related information-services that can further be shared with other private healthcare providers, clinics and laboratories.

3. ISSUES OF SUSTAINABILITY IN HEALTH

3.1 Affordability for Health and Healthcare

Affordability for health relates to access to income and resources to buy healthcare and invest in inputs that produce health (nutritional food, medical care, etc). It is the responsibility of the government to ensure that all income groups can afford health and healthcare, as and when needed. The economic system that does not practice strategies that secure health for all is not fully sustainable. Households need to have enough resources to act as self-sufficient units to produce good health for all family members. The economic system for health is therefore not independent but embedded in other sectors of the economy, such as food and agriculture, environment, housing and shelter, and livelihood for promotion and protection of health. A healthy nation can lead to growth led development by increase in productivity. However, if people can not afford a certain minimum for health, or become financially broke when sickness strikes the family, health protection should become a state responsibility. In Pakistan, there are differences in urban and rural area health-indicators. Rapid urbanization and growth of major cities is leading to ever new health threats due to factors like more centralized decisions for health resource management and lack of resources available for health. It is, therefore, very important that health is transformed as the focus of national sustainable development strategy through measures, such as increased access to healthcare. Strong institutional support structure is needed to ensure that all persons can afford good health. However, so far, health-policies have not operationalized the measures for protection and promotion of health. The health-policies remain limited to defining health services in terms of major healthcare programs that focus on some areas only. For a sustainable health strategy for all, and for ensuring health affordability, it is important to address issues of health as cross cutting themes in other sectors of the economy and adopt policies and mechanisms toward sustainable health-development, not only within the formal health structure of the government but bring improve private partnership.

In Pakistan, a majority of people (around thirty percent) persons live in absolute poverty. It is also not expected that, as a result of economic growth,

enough resources will be generated to achieve universal healthcare coverage for all. Therefore, who will benefit from the public spending on health (poor or non-poor) is a big question. The costs associated with healthcare discriminate against the poorest people. When most people live in poverty, there is a strong need for reducing out-of-pocket spending on health and this can not be achieved without government support for the poorest. Poverty, inadequate funding for health, and affordability are issues that will hinder sustainable health-development in Pakistan. With little success achieved in the reduction in the population growth-rate in the country, the number of people living below the poverty-line is still rising and no significant progress can be expected in health and nutrition in very low income settings.

3.2 Issue of Good Governance

A review of health-policies establishes the fact that Pakistan has been unable to implement successfully its health-policy goals. Most of the targets that were set in different policies were not achieved. Many factors were responsible for this weak performance of the health-sector. The issue of governance turned out to be important as policies were planned and documents were prepared but, due to bad governance, inefficient funding mechanism, centralization of programs, and lack of training of healthcare human resources, health-project implementation became difficult. Other issues were related to improving the efficiency of the health-system through measures, such as (i) adequate resource-allocation, (ii) pulling money away from wasteful resources into the productive ones, (iii) setting adequate priorities for (a) risk- management (b) healthcare coverage and improving funding for health through better public/private partnership. However, these measures also remained staggered and were not implemented for improving the efficiency of the health-system in Pakistan. When public functionaries do not act in the public interest, it becomes extremely difficult to achieve success in the stipulated goals. Among public functionaries, not only the government officials and politicians are expected to play a role, but all those providing public and private services (benefits) in health need to be accountable. Pakistan badly needs to assure that the governance issue for public-health performance standards is addressed, with respect to measurable performance- standards in the health-sector. The Government of Pakistan has therefore, initiated the process of devolution and decentralizing of power to address the healthcare needs more effectively. The following figure shows the process of devolution, as initiated by the government.

3.3 Issues of Distribution

In Pakistan, health care resources and health infrastructure is not evenly distributed across gender and regions. This unequal distribution poses a challenge for improvement in the overall health state. The following table shows health care infrastructure distribution across areas.

The distribution shows that in Pakistan, certain regions have higher number of institutions for providing healthcare (such as hospitals, dispensaries, MCH, RHC), as compared to others and the distribution of healthcare personnel is also skewed toward some regions. If these regions are classified by population, it is clear that the distribution does not always appear to be need based. Pakistan's performance, as compared to other countries, is also poor in terms of health-development index and health-index rank.

3.4 Inefficiency

Efficiency means obtaining better health-outcomes/ output with the same amount of resources available for health and adopting policies that help to attain these objectives. Another angle to look at is reducing costs or minimizing waste of resources in non-productive uses. In the health-sector, major costs are incurred for the construction of hospitals, and managing recurrent costs (balance between salary and non-salary costs). Wage bills of doctors and administrative staff account for more than seventy percent of recurrent spending. In Pakistan, where per-capita health-spending is low, the WHO Commission on Macroeconomics and health recommend donor-assistance along with increase in domestic financial resources. The Commission estimated that, if an increase in funds is invested in high priority areas, such as infectious diseases, nutritional deficiencies and maternal complications, together with an increase in local spending, it can avert a significant number of deaths, see HDR (2003, pp.101). In Pakistan, deliver of health-services is not very efficient. The state of health- infrastructure kept deteriorating and was unable to deliver appropriate health services, and centralized decision-making resulted in lack of empowerment at the grass-root level

4. PROPOSED SUSTAINABLE SOLUTIONS

4.1 Improved Coverage, Efficiency and Utilization

Pakistan's health-system is not very strong and there are many constraints for

expanding healthcare coverage for all, or offering treatments to those who are suffering. Small budgetary allocation by the government promotes under-utilization of health care facilities, and poor performance results in funds going waste instead of being absorbed in the health-system. Pakistan is financially constrained by resources and allocates only a limited budget that is not able to cover all illnesses or diseases. Other countries facing similar funding-constraints, for example, Bangladesh, Zambia and Mexico are trying to focus on interventions considered to be essentials and, by doing this, they are managing to expand healthcare coverage, see WHO (2000). Pakistan's current focus of the health-system on major healthcare programs takes up most of the resources at the expense of other interventions that are needed by the population or the overall health-system. The major funding for these programs often comes from the donors who can cease funding at any time and make the program unsustainable in the long run. To avoid this, there is need to integrate disease-specific programs in the overall health-system of Pakistan. One way of doing this is to increase distribution of healthcare facilities and avoiding wasteful use of resources. Resources must be reallocated to those activities that ensure positive health-outcomes, instead of promoting under-utilization of public-health facilities in absence of medical services, therapeutic drugs and low incentives for the health care personnel. In this regard, a successful example of Kerala (India) can be quoted that has expanded healthcare coverage through better primary healthcare and distribution of drugs. In Pakistan, there has been no sustained progress in primary healthcare accessible to all. Instead, the social protection mechanism for the very poor is not well defined and this hinders expansion in healthcare coverage. Access to healthcare is mostly limited to those with access to resources and ability to pay. To overcome this, it is important to devise adequate healthcare financing schemes that not only increase coverage for all, but contribute to reducing the burden of disease for the very poor.

4.2 Development Synergies

The sustainable health-strategy should focus on programs and policies that are consistent with the overall developmental plans initiated in the country. Development in the health sector should take place simultaneously within the overall development process and accommodate demographic changes, to take care of the changing healthcare needs of the country. Appropriate health policy that ensures equality in access to health and healthcare should be developed. Issues arising because of the population influx in economically active areas should ensure that environmental disruptions are minimized, and

concerns of displaced persons should be taken into account.

For this purpose, women and children should be prioritized for reaping the benefits of the overall development strategy. Female empowerment can be ensured through better decision making in health related matters, better education and policies that enhance women's access to health services. The national sustainable policy should enable women to lower their physical and emotional burdens and improve their productive capacity in the labor force of the country. In Pakistan, fertility rate has not yet reached a replacement level of 2.1. One strategy should be to increase child- survival through better health and education of mothers, improved sanitation, nutrition and primary healthcare, side by side with the family-welfare programs. To make health sustainable for all, reduction in population-growth is important and should be achieved hand in hand with overall economic, social and environmental policies. One important aspect is to promote better awareness at a small-family size, thus reducing the need for large families through better education and female empowerment.

CONCLUSIONS

For a sustainable strategy for health, resource-management and development-programs should ensure sustainable use of resources for health, to improve the quality of life for all, and health-services that are not restricted to people with resources.

The population, health, environmental and development policies need to be integrated to address the issues of morbidity and mortality arising from water, food, air borne diseases.

There is also a need for bridging the gap between developed and developing countries on issues of developmental equity and addressing the broader issues of land degradation, water scarcity, deforestation, industrial and municipal waste and demographic dynamics. More recently, new measures are in place to improve governance and reduce poverty, through a process of devolution in the sector of health. However, massive health sector reforms are still needed to put the health- sector on a path that sustains health, in the long-run.

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NATIONAL e-HEALTH POLICY: OPTIONS AND ISSUES

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ABSTRACT

This paper reviews various issues regarding a sustainable e-Health Policy at National Level and various options pertaining to it. e-Health is an umbrella-term which envisages both modes of electronic health-data management, transmission and analysis for diagnostic, education and administrative purposes viz; Health Informatics & Telehealth. e-Health has become a necessity in the Pakistan's healthcare delivery system, in the backdrop of most of her populations living in rural and hard areas, with little or no access to expert healthcare, disparities in the healthcare delivery-facilities in urban and rural areas, neglected women & child health and poverty level above 30%.

There has been governmental, as well as professional group's, interest in eHealth implementation in Pakistan. And some pilot-project had been initiated. But generally it has been observed that these projects failed to produce a 'role model' impact because they either could not be sustained or worked without a clear goal and targets. The causes of such failure include lack of integration in policy-synthesis, among various pilot-projects for sharing of information and experiences and little project-planning documentation.

The author in this chapter points out some important issues relating to policy formulation in implementation e-Health in Pakistan, which include; policy-related issues, organizational and human capacities issues, financial and technical issues. Relevant questions to these issues have also been raised. More importantly, ethical and legal issues, though not discussed at length, yet they are significant at strategic level in current scenario, and need more attention during policy-synthesis.

As Pakistan's healthcare system is influenced by World Health Organization, reference to guidelines of e-Health development-plan at country-level has been made, as major health care advisory partner's perspective.

The author recommends a multidisciplinary approach in composition of Policy-

synthesis forum and believes that assessment of user-need is of paramount importance. The exercise should aim at ultimate integrated systems, with standardization and quality elements as a base. Unified coding, health-database language, information-exchange lingua franca and consideration for including local language at some level through development of indigenous and customized solutions can pave the way for growth of effectiveness of e-Health in Pakistan.

1. INTRODUCTION

Telemedicine & e-Health are now becoming popular terms in Pakistan, often referred to by high-profile government and healthcare professionals. Globally, e-Health & assistive technologies, including telemedicine, are rapidly evolving concepts and in the formative stages to acquire the definite shape of a discipline. WHO has established a department of Essential Health Technologies with relatively wider range of use of state-of-the-art technologies in the scope of healthcare-delivery systems.

- a) e-Health refers to the use of modern information and communication technologies to meet the needs of citizens, patients, healthcare professionals, healthcare providers, as well as policy makers (Ministerial Declaration, e-Health, 22 May 2003): health-related activities, services and systems carried out over a distance for the purposes of global promotion of health, disease-control and healthcare, as well as education, management and research for health. (L. Androuchko, ITU-D, ITU Workshop on Standardization on eHealth, 2003) eHealth is an emerging field in the intersection of medical informatics, public health and business, referring to health-services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve healthcare locally, regionally, and worldwide by using information and communication technology (Journal of Medical Internet Research, 2001).
- b) Telemedicine is the use of telecommunication technologies to provide healthcare services across geographic, temporal, social, and cultural barriers (J. Reid, 1996). The delivery of healthcare services, where distance is a critical factor, by healthcare professionals using information and communications technologies for the exchange of valid information for diagnosis, treatment and prevention of diseases and injuries, research and evaluation, and for the continuing education of healthcare providers, all in

the interest of advancing health and their communities. (WHO, 1997). Over the last years, several international organizations and institutions, such as the World Health Organization (WHO), UNESCO and International Telecommunication Union (ITU), have been supporting the application of health telematics, especially in remote and rural areas (ITU, 1996)

e-Health has, therefore, now become an umbrella term, which encompasses both, health informatics and Telehealth.

2. BACKGROUND

Pakistan has its own issues pertaining to implementation of e-Health. Pakistan has 160 million populations, having around 100,000 qualified doctors and only 18,000 specialists. Most of these doctors are prone to practice in more urbanized areas while most populations (around 70%) live in underserved & rural areas. There is growing support from the stakeholders for e-Health and Telemedicine implementation, and funds availability is being made possible from different institutional and ministerial sources within the country and abroad.

Pakistan is pursuing a vigorous Information Technology and Telecommunication development policy, with special emphasis on nationwide broadband infrastructure & access. Cost is still an issue, along with last mile access. Also, local hardware industry needs support. Local language content also needs to be considered.

There have been initiatives in e-Health projects in Pakistan from the beginning of year 2000. But all these initiatives were from different platforms, with out any coordination with each other. Video conferencing to demonstrate teleconsultation by Technology Resource Mobilization Unit and announcement of Telemedicine network in Punjab by the provincial health minister in 2003 seemed to be unlinked. In Jinnah Post-Graduate Medical Center, Karachi, two telemedicine projects are going on, but both have no interlink under the same ceiling. There was some development of telemedicine program in Holy Family Hospital, Rawalpindi, especially after the earthquake of October 2005, and people were trained in USA and were supported by other international specialized groups. The Commission on Science and Technology for Sustainable Development in the South (COMSATS) has also developed a pilot-project and has made some progress.

More recently, Electronic Government Directorate, Ministry of Information Technology has invited proposals from companies having a legal presence in Pakistan for three major telemedicine projects in Punjab and Sindh. But these projects seem to be least formally connected with the Federal and Provincial Health Ministries.

Thus in Pakistan, e-Health (including informatics and telehealth) can play an important role in health development, including administration, tele-education & training, quality health and improvement in the efficiency of the healthcare delivery. But a comprehensive National e-Health Strategy, in a Policy Framework, is imperative for measurable outcomes.

The interest should be focused in the use of technology which (*TeHIP, 2005*):

- reduces patient journeys, hospital visits and hospital admissions
- saves the time of healthcare professionals
- supports individuals living at home to look after themselves
- improves the quality or effectiveness of the care or treatment that is delivered.

Globally, it is now being recognized that Telehealth can provide cost-effective & economical healthcare to underserved & rural areas. Telehealth is also becoming an important means of emergency-medicine & disaster medical management.

Telemedicine is more than a technological issue; it rather transforms national health- care services to make them more accessible, available and equitable (EHO EMRO, 2006).

3. COMPONENTS AND APPLICATIONS OF EHEALTH (*EUR J Med Res., 2004*)

Applications of eHealth can be grouped into four main areas (*Mitchell 1999*). These are as follows and explained in Box-1.

- e-Care
- e-Learning
- e-Surveillance
- e-Government/e-Administration

Box - 1

e-Care	Electronically facilitated citizen self-help Remotely promoted and monitored preventative healthcare programmes Health and biological signal monitoring Individual case-management Electronically assisted health-assessment Remote professional consultation and sharing of data amongst professionals, especially the provision of remote second opinions Assisted interventions by healthcare professionals Emergency medicine and vital sign, disasters monitoring, such as earthquakes, plane crashes... Access to and updating electronic healthcare records
e-Education	Remote patient learning for preventative care and disease-management Remote professional learning and competence monitoring Remote access to high-quality health-information, including current literature Remote access to evidence-based medicine
e-Surveillance	Public health and disease-reporting of notifiable disease Real-time epidemiological analysis Research and electronic health statistical analysis Management of consequences to health of natural and man-made disasters
e-Administration	Billing and administrative data management, to support the healthcare process Aggregation and reporting of administrative data, including quality, clinical outcomes, etc.

4. POLICY SYNTHESIS MECHANICS

For policy-synthesis process in any area of human services, the main goals for the policy makers and regulatory authorities are to:

- Achieve economic growth;
- Accelerate poverty-reduction;
- Achieve sustainable development; and
- Attain national integration and development goals.

And for the purpose, they are given mandate for:

- Development of Policy-Framework and Conducive Environment for:
 - Investment,
 - Development of infrastructure and services.
 - Quality of service and Services Accessibility.
 - Service Affordability.

Norwegian Telemedicine Center, a global leader in Telehealth and WHO collaboration center has identified policy-related issues in its publication (*EURJ Med Res, 2004*)

The Policy synthesis can be categorized in four groups:

4.1 Policy Related Issues

- Knowledge of eHealth & Telemedicine techniques is needed by the planners, administrators and health care professionals along with its integration methods with the services of their domain. “Most decision-makers, managers, health care professionals and citizens in most countries lack basic information on telemedicine services and potential. This has resulted in misconceptions, resistance to telemedicine and relative lack of progress in project initiation”.
- The implementation of telemedicine & eHealth requires multidisciplinary collaboration, with the active participation of IT specialists, telecommunication operators and health care professionals. There is a need to bridge the gap between these communities at all levels. Concerned National ministries also need to work together towards introduction of a telemedicine & eHealth policy and achievement of universal service where emergency services, health and social information systems are concerned. The creation of national associations, committees, task forces and the like, with a multidisciplinary composition, is necessary to bring together IT, telecommunication and health professionals, lawyers, industry and others to assist with awareness-raising at a national level. The process should start with conducting a users’ requirement analysis. The analysis should address the definition of objectives, functions, and utilization of health information and assistance in the evaluation of existing information systems.

Contextual questions in this regard which need to be answered include:

- a. What are the main challenges in the country's health care system?
- b. Which of these could be successfully addressed by eHealth & telemedicine?
- c. What are the current or planned health care programmes or activities in the country that could benefit from the application of eHealth? In which way?
- d. Have any strategies or policies for implementing eHealth & telemedicine been developed in the country previously?
- e. Have there been any projects or systems using eHealth previously? If so, what is the experience?

4.2 Organizational & Human-Capacities Issues

- “Full understanding and commitment by top management to telemedicine should be secured and seen as essential for the success of telemedicine projects”².
- There are several challenges related to the organizational issues pertaining to ownership & commitment of the introduction of eHealth, changes of pattern of work and procedures and the professional resistance.

Contextual questions in this regard which need to be answered include:

- a. Which are the geographical areas, local institutions and/or focal points that would be involved in an eHealth project/service? & why these areas are selected?
- b. What kind of human resources are available? And level of Computer literacy among the key personnel?
- c. What kinds of training programs are needed?
- d. How is the issue of medical responsibility within the country's health care system in relation to eHealth?
- e. Is there any existing legislation on confidentiality, security and privacy which could apply for eHealth services?
- f. In case of provision of services between countries, is a special license for health care personnel required? If not, will this cause any problems for the introduction of eHealth?

4.3 Financial Issues

- Any national plan should consider the availability of resources that will assist either at the planning stage or at the implementation stage. These resources may include financial resources to support travel, consultancy

- assistance; access to information and data, locally and internationally.
- The costs can be categorized in investments and ongoing costs.
- The sustainability issue should be considered should be considered even at this early phase.

Contextual questions in this regard which need to be answered include:

- a. How will the service be financed in terms of costs?
- b. What is the level of communication costs in the country?
- c. Who will provide cost of training & maintenance?
- d. What contribution will be provided by in terms of Public Private Partnership?
- e. What will mode & source of payment of services?

4.4 Technical Issues

- “Telemedicine is still not recognized as a technical programme within the ministries of health and is not a unit at the ministries of telecommunications in countries of the Region” (*EHO EMRO, 2006*).
- Technical issues include COMPLEXITY & VARIETY in;
- Objectives,
- Functions, and
- Contents of Applications.
- Technology selection should be based on:
- Actual ICT infrastructure of the country and
- Outcomes of the User requirement analysis.
- There should be consideration of GAP in:
- Technological Innovation and its actual use &
- In the integration of the architecture and work environment.
- There should be consideration of Standardization.

Contextual questions need to be searched for answers are:

- a. How is the telecommunication infrastructure in the country, in terms of distribution and costs?
- b. What type of communication technology is used?
- c. Is the telecommunication infrastructure reliable?
- d. Are there any government plans for the current telecommunication infrastructure?
- e. Which are the Internet Service Providers in the country?

- f. Are there any key aspects that should be known, like power supply, difficult geography?
- g. How is the distribution of technical equipment such as computers, digitized medical equipment, in hospitals, GP Clinics and Administrative units?
- h. How will maintenance be cared for?
- i. In case of local equipment vendors, are they likely to provide training?
- j. Which are the main telecommunication providers in the country?

5. NATIONAL E-HEALTH DEVELOPMENT PLAN; W.H.O PERSPECTIVE

In 1995, the Secretary-General of ITU and the Director-General of WHO signed a Memorandum of Understanding (MoU) defining arrangements for cooperation in the field of telemedicine. Under the terms of the MoU, the two organizations will help to introduce "dedicated communication and informatics technologies to facilitate the provision of health and medical services" in a bid to improve the quality of life of people living in rural and remote areas, people whose basic needs are far from being met.

The World Health Organization (WHO) Regional Office for the Eastern Mediterranean (EMRO) began eHealth initiatives in 2001 by organizing the meeting of Health and Medical Informatics Focal Points in EMR in Cairo, Egypt. Last of the regular series of Regional e-Health Conferences was organized in 2006. WHO EMRO has prepared guidelines for e-Health Development Plan which addresses capacity building, applications and collaboration at regional level & for country level e-Health plans which focus on:

- a. Development of organization entities linked at the apex with Federal Ministry of Health with well defined roles of IT department for the services to maintain integrity of systems.
- b. Legal framework to govern IT in health care.
- c. Adherence to International standards in terms of health & ICT policies.
- d. IT plans and strategies development.
- e. Regular budgets for ICT support.
- f. Informatics training programs to medical students & professionals.
- g. Use of Internet for healthcare information sharing and education.
- h. National committees for GIS mapping.
- i. Development and maintenance of Library databases for knowledge

sharing.

- j. National informatics profile for sharing with Regional office & other countries.

6. CONCLUSIONS & RECOMMENDATIONS

- e-Health has key driver for resource-generation in Pakistan, specially in the form of scarcity of healthcare professionals and for majority of citizens of Pakistan, health-care is inaccessible and inequitable.
- e-Health is a force for transformation of healthcare delivery-system and makes it more accessible and equitable; therefore needs due importance in top governmental segments, in terms of development of national policy-framework and development plan.
- Multidisciplinary collaborative characteristics of eHealth are not being appropriately realized by the major stakeholders and sporadic initiatives from diverse sources, which lack coordination and therefore make such initiatives less effective.
- Catering for the need of e-Health in Pakistan requires some rapid steps, especially in the wake of natural calamities.
- Only Teleconsultation aspect of e-Health, through videoconferencing, is being emphasized in the country and other functions are relatively less considered.
- There is a need of comprehensive study for e-Health national policy framework and plan and it makes imperative the full understanding of e-Health concepts, techniques, processes of its implementation and result based evaluation of the initiatives, for all major stakeholders.
- As a first step, a national workshop under the auspices of Federal Health Ministry in collaboration with WHO, should be organized with participation of all stakeholders, including healthcare and ICT professional, representatives of ministry of information and telecommunication, Higher Education Commission of Pakistan, private sector & industry, and professional associations, in order to discuss and develop a consensus on National eHealth Policy.
- A consequent standing national e-Health forum/task force may establish core principles to ensure a coordinated, cost effective and integrated approach to implementation of e-Health in Pakistan and formulate a National eHealth Development Plan.
- Also, a long term process to address the challenges of emerging new technologies may be organized.
- Indicators and parameters should be identified to assess the effectiveness

of e-Health in attainment of goals, especially of access of quality healthcare by all citizens of Pakistan.

- National e-Health Development-plan should define the goals of e-Health in Pakistan, identify areas of need, execute feasibility studies and propose R&D, pilot and operational projects.
- National e-Health Development Plan should be based on consumer-driven approach, and should envisage integration of eHealth in the existing healthcare delivery-system, through participatory management.
- National Development plan should also envisage the coordination of available resources and strategies of generation of resources for sustainable e-Health services.
- The plan should envisage development of interoperable integrated eHealth systems, through indigenous solutions, and extend support to local hardware, biomedical and software industry, with promotion of local language content.
- The academic programs for e-Health, as collaborative programs, should also be envisaged in the plan, both at undergraduate and post graduate levels, to promote research and technological innovation.

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PROSPECTS FOR IMPROVING HEALTH IN PAKISTAN, USING e-HEALTH: LESSONS LEARNED AND A PROPOSAL

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ABSTRACT

E-Health, the application of information-technology to improve health and healthcare in less developed countries has great potential, as the infrastructure to support telecommunication increases. This chapter focuses on lessons learned from work done in e-Health in different parts of the world and contains a proposal for using mobile phones to improve healthcare-services in Pakistan.

As Kerr White, one of the founders of evidence-based medicine said, “Have a little statistical compassion and take a look at the evidence before providing inadequate care or wasting millions of dollars.” He also said, “Good judgment comes from experience. Experience comes from bad judgment.”

We want to share two lessons that we have learnt about e-Health from our experiences in the healthcare-system in different parts of the world. Those two lessons are:

- 1. Look first for simple solutions, using appropriate, available technology: there are e-Health solutions that can improve healthcare that are not dependent on high end-technology*
- 2. Evaluation is essential to e-Health. We must be certain that our e-Health solution really works.*

1. INTRODUCTION AND SOME LESSONS LEARNT

The inspiration and philosophical direction of this work draws from the great thinker, Al-Hujwiri, who wrote the first text in Persian on Sufism in the 11th century. Al-Hujwiri, or Datta-sahib, as we know him in Pakistan wrote, “Some say knowledge is superior to action; others say action is superior to knowledge. Both are wrong. Unless knowledge is tied to action, it is not deserving of the

recompense.” The utility of knowledge is what should guide our efforts. Because e-Health and the technology associated with it is so fascinating in itself, the utility, i.e., improvements in health, is sometimes forgotten.

There are many simple solutions, using appropriate technology, that have not yet been fully exploited to improve health. Too often, e-Health focuses on the latest technological innovation or on new frontiers of technology. We need to distinguish between solutions that can be done with a simple mobile phone and those that truly require videoconferencing. The vision of what technology can provide is so powerful, and the technology is so exciting, that it distracts us from good judgment.

In the United States the vision of a fully integrated information-system in a hospital or health-system has led to over a decade of work and investment. Despite years of work and millions of dollars spent, there are still very few examples of success. The obstacles were many. Health-systems are much more complex and much more context-specific than many system-designers anticipated. There are few, “off the shelf” solutions in healthcare. After a decade of failure, we saw the same promise offered in Africa when large sums of money became available for HIV/AIDS prevention and treatment. Again, there are very few success stories. *Successes tend to be on simple applications.*

One very memorable failure in our experience was the promising idea of using cell-phones to monitor use of medication for people being treated for HIV/AIDS in Africa. Antiretroviral medication must be taken every day. Village health-workers have been useful in motivating proper use of medication. A scheme was developed to use cell-phones to collect and manage the medication, hoping to improve upon manual data and management system. The program was of interest to donors, because drugs to treat HIV/AIDS are very expensive and are being provided by donors; proper use of these drugs is very important to donors. While the data was successfully collected, yet after two years no plan had been developed to use the data. The data remained unused in centralized computers, in a city far away from the field-setting. The system died because of lack of utility. We are sorry to say that this is not an atypical experience.

The second lesson learned is that evaluation is essential. Without evaluation, we cannot make claims that e-Health has brought benefits. Evaluation needs to be part of inception and implementation of the program. Too often, evaluation is left to the end of a program, more of an after-thought. Most

frequently, evaluation is planned when a program gets into political difficulties and donors start asking questions about the success of a program. Evaluation is best done when it is part of the routine program. Evaluation needs to be highly contextual. Healthcare-systems vary greatly. Language and cultural issues must be appreciated.

2. A PROPOSAL

With these two learnt lessons shared here, we would like now to move on to a proposal for what we think would be of use in Pakistan, using mobile phones to improve healthcare in the country. Again, we stress that we should look for simple, appropriate technology and that we should make evaluations of our efforts that are part of program development.

Another issue that should guide our efforts in Pakistan is that e-Health will improve health of poor and rural people of the country. Overcoming distances has been one of the great promises of telecommunications for health. Connecting people using technology should be able to help healthcare reach those in greatest need and the least able to receive care, because of geographic barriers. The digital divide is not just between countries, North and South, it also exists within countries.

Available and appropriate technology needs to be evaluated, to ensure that the improvements hoped for health are realized. Simple solutions should be sought before schemes that depend on sophisticated technology. Mobile phones are widely available even in remotes parts of the country. Putting them in the hands of lady health-workers (LHWs), the front line of the rural health program in the country holds promise. Before a mobile-phone scheme is scaled up, careful evaluation is needed to optimize the potential. Using mobile-phone for continuing education and supervision is been proposed here. Once a mobile phone platform is in place, other technologies can be introduced to improve the system. Currently, the Aga Khan University, Department of Community-Health Science, is working with Carnegie Mellon Institute on an artificial intelligence voice-recognition system that LHWs could ask questions to about patient-care.

Using appropriate, available technology in Pakistan to improve the quality of healthcare for the masses of Pakistan, who currently are in greatest need, should be considered a priority. What follows here is a proposal to improve the Lady Health-Worker's Program in Pakistan.

3. PROPOSAL TO EVALUATE THE USE OF MOBILE PHONES FOR LADY HEALTH-WORKERS

The rural population in Pakistan faces a higher burden of morbidity and mortality, due to causes that are both preventable and curable. Government of Pakistan is relying on community-based primary healthcare initiatives, such as Lady Health Workers' (LHW) Program, to increase access to basic services and enhance referrals (for example visit www.phc.gov.pk). Achieving desirable results from LHW program requires greater communication between LHWs and their supervisors in order to improve knowledge of LHWs and provide regular supervision for their activities. Many developing countries have used mobile technologies, such as mobile phones and Personal Digital Assistants (PDAs) to improve communication with community-based staff in rural and remote areas (Merrell RC, 2004; Oh C, 2005; SATELLIFE, 2005). Pakistan is currently one of the fastest growing markets for mobile phones in the world, and the coverage and penetration of mobile phones is expected to increase over the next decade (World Resource Center, 2006; Telecomworldwire, 2005). These developments indicate that this technology can also be used by social sector, such as health, to achieve its objectives. This proposal tests different uses of mobile phones, to identify the most appropriate interventions that could benefit LHW program in rural areas of Pakistan.

4. BACKGROUND AND JUSTIFICATION

Technical support, monitoring and coordination of the LHWs have been difficult, due to the fact that these workers serve in remote areas. The supervisory layer above the LHW is comprised of Lady Health Supervisors (LHS), Field Program Officers, and District level Health Officials. While the program is designed to provide these supervisors with vehicles and drivers, to facilitate travel and communication, in practice this does not uniformly happen because of the high costs of travel.

Recent evaluations of the LHW program have documented the strengths and weaknesses of the program. The performance of LHWs has been shown to be highly correlated with their level of knowledge. Addressing the educational and professional development needs of LHWs could greatly improve their effectiveness and productivity. This can be achieved by providing a regular source of learning and by improving contact with the supervisors. This proposal aims to make the program more potent and effective by addressing its weaknesses, through a carefully designed information-technology and

communication system.

5. FOCUSED OBJECTIVES OF THE PROPOSAL

There is a need in Pakistan to develop projects that could assess the impact of cellular-phone communication on enhancing the knowledge of LHWs working in rural and remote areas, through on-line lectures and supervision. As a secondary objective, the study should describe the patterns of utilization of the cell-phone by LHWs to contact LHS and the doctor, number of referrals made, and number of sessions attended by LHWs on phone. Another objective of the study is to look at the differences in impact of the interventions between the districts managed by the public, and the ones managed under Rural Support Program (RSP).

6. STUDY DESIGN

Design summary: The proposed study should be a community-based, controlled, randomized trial for improving knowledge of LHWs working in rural and remote areas, by increasing supervision and providing online continuing education (CE). This will be achieved by randomly assigning Basic Health Units (BHUs) to different groups of intervention, along with a control group to assess the impact of each intervention.

The knowledge of the LHWs should be assessed during a baseline assessment and at intervals after the beginning of the intervention (on-line training and supervision). Knowledge will be assessed through standardized testing in selected areas of LHW knowledge base.

7. IMPLEMENTATION

The study should be conducted in the following phases:

- Phase 1: Conducting focus-group discussions, to identify modules of study and develop support for the study.
- Phase 2: Development and Validation of Knowledge-tests for LHWs.
- Phase 3: Conducting a baseline survey/pre-test to find the existing level of knowledge and supervision:
- Phase 4: Interventions in the Experiment and Control groups, and re-testing of Knowledge

Phase 5: Report-writing and dissemination

8. CONCLUSIONS

The case for use of simple, appropriate information-technology has been presented to extend and improve the quality of healthcare in Pakistan. The promise of innovations and rapid advances in information-technology has not translated into significant improvements in health in this country. Lessons from other countries suggest caution. Simple technology has yet to be exploited in many places. Evaluation is critical, before large-scale implementation of an eHealth solution should begin. This chapter provides an example of a evaluation of a simple technology, mobile phones, that may usefully be extended to improve the quality of care provided by the Lady Health-Workers in the country.

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E-HEALTH — THE PANACEA FOR ASIAN HEALTHCARE

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ABSTRACT

E-health can be defined simply as the use of Information and Communication Technology (ICT) in healthcare. The main uses of e-health in developing countries have been to improve access to healthcare services, and enhance the quality of care by making patient-data and other relevant information available to the healthcare providers at the point-of-care. E-health can also provide a medium for economically and socio-culturally appropriate technology solutions available at different points-of-care. The biggest problem at this time is the lack of scientific evidence to convince the decision-makers at the institutional and governmental levels about the benefits of e-health in the local context, and to prove if one technology is better than the other to address the same problem.

PAN Asian Collaboration for Evidence-based e-health adoption and application (PANACeA), is an initiative to generate evidence in the field of e-health within the Asian context, by forming a network of researchers from developing Asian countries. This paper highlights different aspects of this initiatives.

1. INTRODUCTION TO PANACeA

The primary aim of PANACeA is to create evidence for e-health in the developing countries of Asia. The specific objectives are: 1) To support a set of multi-country research activities to address the four core research questions; 2) To create a theoretical model for evaluating good practice in e-health programs in Asia; 3) To build research capacity amongst Asian researchers to evaluate and adopt appropriate e-health technologies and practices and influence policy and decision-makers; 4) To disseminate research findings widely in the regional and international research communities. Partners have been identified from countries in Central, South, and South East Asia, who have worked together to identify eight projects to generate evidence for the adoption of technologically, economically and socio-culturally sound e-health applications in multiple countries. These projects will conduct a detailed-needs and situation-analysis in the first six months (Phase I), followed by two

years of project implementation and research (Phase II). This will be followed by six months of evaluation and reporting (Phase III). Projects will be supervised and mentored by the Advisory and Monitoring Team (AMT) through online-discussion forums and visits by the project manager, deputy project lead, and the members of AMT.

Several crosscutting issues have also been identified, which will be investigated in the Asian context, and will be included in each of the projects. Evidence generated from these projects will be disseminated to policy-makers and decision-makers at the institutional and government levels in all Asian countries. PANACeA offers a unique way of developing evidence in a local context, yet involving a large number of countries and developing new partnerships that may last beyond the duration of this project.

Use of ICT in Asia has grown at a tremendous pace. Most of this use is driven by reduction in Internet charges, high use of mobile phones and PDAs, and lowering of cost of hardware. These enablers have led to high teledensity and a tremendous increase in connectivity. Table-1 shows the growth of ICTs in Asian countries during the last decade. This growth calls for opportunities to explore ICT use in healthcare. With current growth in ICT, it is possible to expand the use of e-health to more countries in Asia, but this would require evidence of success in local context, using sound methodologies, to convince the policy-makers at institutional and government levels. It is also important to look for culturally and socially appropriate solutions for these countries. Current level of evidence does not provide convincing evidence to support e-health activities, due to lack of properly designed and controlled trials. Evidence is also missing for technologies that are more specific to the developing countries, such as use of mobile technologies in provision of healthcare.

Collating, synthesizing, and using the available information, various recommendations were provided for consideration by a Project-Design Team. Overall, it was concluded that a structured approach to IDRC's e-health investments in Asia was desirable, in order to maximize local development of e-health and practices, as well as benefit to IDRC and the Region. This would best be achieved through development of a regional thematic network (PANACeA - PAN Asian Collaborative for evidence-based e-health Adoption and Application) that would bring focus, stability, and cohesive direction, development, and accountability to IDRC e-health activities in Asia. It was recommended that PANACeA incorporate support mechanisms to address the

deficiencies identified during the assessment study. Doing so would lead to development of local skills and solutions, and a sound evidence-base, which would – in turn - inform and influence options, directions, and consequences associated with e-health development, policy, strategy, and application in Asia.

2. PROBLEM AND OBJECTIVES

Problems related to access and quality of care, in developing countries of Asia, have attracted many decision-makers to look for e-health solutions. The biggest problem these people face is to find evidence to prove which particular technologies and practices can best address the issues that their countries are currently facing, and how they can take the best use of e-health in their local environments. Thus problems can be summarized in the following four research questions:

- i. Which e-health applications and practices have had the most beneficial outcomes on the health of individuals, communities and on the improvement of health- systems?
- ii. What are the best ways for ensuring that beneficial outcomes can reach the segment of the population that still doesn't have adequate access to health-services?
- iii. What is the potential of using new pervasive technologies, such as mobile phones / PDAs, as tools to make the delivery of health services or information more effective?
- iv. What types of technologies / applications are best suited to help prepare for, or mitigate, the effects of, disasters, pandemics and emerging and re-emerging diseases?

Since most of the issues related to applications of e-health in developing countries are inter-jurisdictional, solutions to these problems can also be found through collaboration between different countries. Examples of these solutions are the standards for developing e-health software, such as HL7, and the standards for coding, such as Snomed or International Classification of Diseases (ICD). A collaborative approach, with inter-jurisdictional partnerships, would also deal with the problem of lack of expertise in e-health in developing countries, by building partnerships between different stakeholders, ideally from different countries facing similar problems. These partners can use their collective knowledge of technology, health and social issues and research methodologies to generate evidence that could justify the use of socially and culturally appropriate technology for the intended purpose

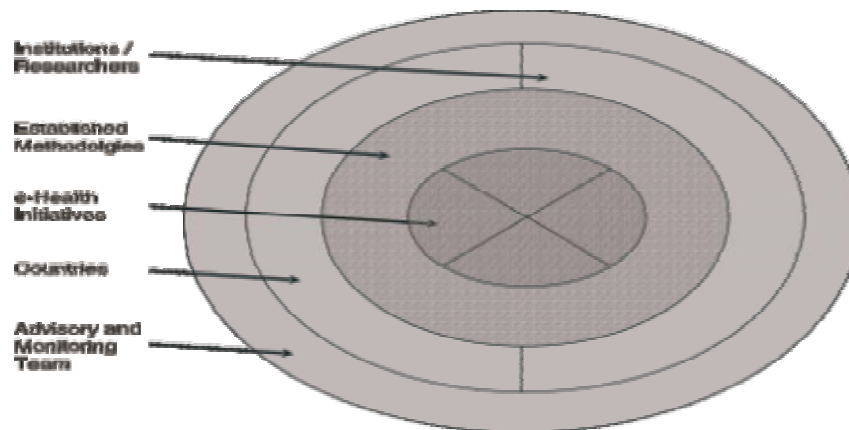


Figure - 1: Figure Showing the Network Design of PANACeA

in these countries. Many Asian countries share similar health-issues and need proper evidence to justify the use of e-health technologies in their situations. Many of these countries may benefit from the suggested partnerships that can ensure use of sound methodologies in the research studies. Testing of same technology for similar health-problems in different partnering countries should support both scalability and sustainability.

This forms the basis for the creation of PANACeA, which will facilitate networking between a number of developing countries in Asia. Key features of this network will be:

- Developing regional leadership in e-health, along with encouraging South-South and North-South partnership.
- Supporting technical and social innovation.
- Ensuring scalability and policy relevance.
- Encouraging capacity-building, knowledge-sharing, peer-support and mentoring.
- Create gender sensitivity among planners of e-health programs.

The primary aim of this project is to generate evidence for developing e-health programmes in the developing countries of Asia. The general objective of the project is:

To undertake collaborative research that promotes evidence-based adoption and

application of technologically and socio-economically appropriate e-health solutions within the PanAsian (South Asia, East Asia and Southeast Asian) contexts.

In addition, PANACeA has the following specific objectives:

- a. To support a set of multi-country research-activities, to address the four core research-questions.
- b. To create a theoretical model for evaluating good practice in e-health programs in Asia
- c. To build research capacity, amongst Asian researchers, to evaluate and adopt appropriate e-health technologies and practices and influence policy and decision-makers
- d. To disseminate research-findings widely in the regional and international research communities

3. METHODOLOGY

PANACeA puts its major emphasis on the small-scale, multi-national e-health projects that will be conducted by the researchers from various Asian countries. Figure-1 shows the diagrammatic representation of the network, where the e-health initiatives or projects hold the central core. The core is surrounded by established methodologies, which are crucial for producing sound evidence from these projects. The circle outside the methodologies indicates the countries and institutions that are part of PANACeA, whose commitment is crucial for the success of e-health programs. The outermost circle indicates the PDT, which will assume the role of 'Advisory and Monitoring Team' after the start of this project.

Another important aspect of this project is the crosscutting issues, also named PANACeA Common Thematic Activities (PCTAs), identified by the PDT to support the e-health initiatives. These issues will be lead by one PDT member and supported by 1-3 other members. These PCTAs are:

- a. Communication and Dissemination;
- b. Change-Management/Readiness;
- c. Systematic Review on Telehealth in Asia;
- d. Systematic Review on Health-Informatics in Asia;
- e. Open Source / Open Standards;
- f. Outcomes; and

G. Policy.

The driving principle behind this project is to use a network modality such that the sum of the individual research-activities are greater than its parts. In order to meet the objectives set for PANACeA, the PDT decided to support small-scale multi-national research projects, which can generate evidence for technology-use for different purposes and in different situations. Each researcher is participating in one or more of the research projects but the results of these projects will benefit all the network members, in addition to being widely disseminated outside the network. It was also decided, that to enhance the impact of these projects, a number of cross-cutting issues would need to be addressed. The following methodologies were used to develop these projects, along with planning for the PCTAs.

4. SELECTION OF RESEARCH PROJECTS

Research projects for PANACeA were developed during a workshop in Clarks Field, Philippines, from January 31 to February 4, 2007, where participants were invited from different Asian countries. During this workshop, the participants developed several research-projects, from which eight were selected for further development. One PDT member was assigned for each project so as to review the proposal and suggest necessary changes to make the project methodologically sound and robust. Titles of each of these research projects, along with the leading and participating countries, the general objective of the project and the PANACeA research questions are outlined below in Table-2.

Each research proposal has developed an initial research-methodology to achieve their objectives that will be improved during the needs-assessment period, with the assistance of the AMT. Common conceptual and methodological principles in each project are the use of mixed methods (quantitative and qualitative research methods; evaluation research to identify and measure proximal, intermediate and, to the extent possible, distal health-outcomes of the e-health solution; focus on sustainability, particularly knowledge-transfer and policy-influence; examination of change-management issues; and consideration and analysis of gender and socio-cultural factors.

Looking at the differences in gender-inclusion and status of the population in different countries of Asia, it is important to include gender-analysis as an

important consideration for PANACeA. Each research project will be required to ensure that the benefit of their interventions reach both the genders, with more emphasis on women. Gender consideration would help in reducing the digital divide, by ensuring that the technology is used by both the genders to their benefit, and no one group takes undue benefit of advances in e-health.

The projects will also put high emphasis on the end-users and the issues faced by them, rather than on introduction of high-tech devices and technology. The researchers will also try to make technology-applications simple and readily useable for the end-users. This aspect will be especially considered during the needs-assessment phase, to ensure that the simplest technology is chosen to address the health-issues of a community. This consideration will also address the sustainability and replication of the projects in future.

5. EVALUATION

There are two primary foci of the evaluation within PANACeA. First, an evaluation that assesses benefit for IDRC as the funding agency – has their investment in PANACeA been of value from a ‘program’ perspective. Second, an evaluation that assesses the benefit of each individual project – has the particular project-delivered value from a ‘project’ perspective. The program-evaluation will be conducted by the AMT, while the individual project-evaluations will be performed by each project-team. These evaluations, will be in addition to the regular monitoring of PANACeA projects and activities conducted throughout the life of the initiative. They will provide both formative and summative appraisal of the PANACeA initiative and its associated e-health projects.

6. CONCLUSION

e-Health technologies have played an important role in improving healthcare services in many developing and developed countries. Teleconsultations, using live and store-and-forward technologies, have improved access of people to specialized healthcare-services in almost all the subspecialties. These technologies have also been used to improve access to sources of knowledge for both patients and providers of healthcare. The advancements in Electronic Health-Records (EHR), Picture Archiving and Communication Systems (PACS), as well as Health Management Information System (HMIS) provide support to healthcare professionals and managers for proper decision-making. The use of Internet and hand-held devices has opened new avenues

for promotion of health. Many of these technologies are currently being used in developing countries all around the globe, including some parts of Asia. It is therefore that modern means are coupled with health sciences to benefit the masses.

SECTION-B

FINANCING & MANAGEMENT OF TELE-HEALTH

PROPOSING A COMMUNITY-BASED HEALTH FINANCING (INSURANCE) MODEL INTEGRATED WITH E-HEALTH/ TELE-HEALTH

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ABSTRACT

Pakistan's healthcare system is facing many challenges today, including; poorly functional rural health-facilities, low quality of services, poor accessibility and management of service-delivery, low level of public-health allocations and expenditures as compared to regional trends and a higher level of out-of-pocket expenditures. To address these challenges, there is a need to revisit the healthcare policy and strategy. The focus of this paper is on alternate healthcare-financing to increase financing options for closing the resource-gap, encouraging public-private partnerships, accessing new resources and technologies, increasing participation of community and developing strategies to help implement effective interventions at the local level.

One such intervention is to appropriately benefit from health-information technology and the proposed model is a community-based health financing/ insurance, integrated with health-information and communication-technology (e-health/telehealth). According to this model, the services will be provided through a health-card system. The advantages of the proposed model include; alternative forms of risk-pooling (informal sector) that will reduce economic barriers, reduce out-of-pocket payment, extend traditional arrangements, enhance community-empowerment and community mobilization, raise combined/ collective voice, start the process of dialogue with the community and reduce out-of-pocket expenditures, while increasing the utilization of services.

1. BACKGROUND AND INTRODUCTION

Health constitutes a prerequisite for development, as healthy communities in any developing country would have the ability to take full advantage of the growing opportunities for development. The goals of Pakistan's health-sector are to provide efficient, equitable and effective healthcare-services, which would be affordable, accessible and acceptable for the people of Pakistan.

Pakistan's health-sector is being recognized as one of the extensive health-sectors, from standpoint of physical infrastructure and its catchment's population. It consists of three tiers; federal, provincial and district, which provide primary, secondary and tertiary services. The nature of service at these levels includes preventive, curative and rehabilitative services. Notwithstanding that the public-sector has less share in provision of services and expenditures, as compared to private sector, it is the biggest provider of preventive healthcare. At present public health sector's utilization rate is 20-30%.

In the last two decades, the overall efforts of the Government of Pakistan to develop its health-systems, in response to national health policies, have been encouraging. This is revealed by the fact that impressive efforts have been made to expand the health-services' infrastructure and the production of human resources for health. The benefits, however, have been less than expected, in terms of utilization of public healthcare services by the population. In spite of the fact that political and economic instability and high population growth-rate are important factors in this respect the organizational, management issues and resource-constraints in health-sector have also become detrimental factors in the provision of effective and efficient services for healthcare. Furthermore in Pakistan, the State is solely responsible for organizing and financing the public healthcare-sector and due to the rapid increase of healthcare expenditures, its participation in healthcare-financing has declined, as compared to the needs and demands of the population. The current economic, social, demographic and epidemiological factors have also contributed to the rapid increase of cost of healthcare, which requires more resources, even to maintain the current level of health-services.

Therefore, the role of the government is not only to maintain or increase its participation in public healthcare financing, but also to find the optimal mix of alternative sources to finance healthcare-services in a more equitable and accessible way. Thus, alternative strategies to enhance funding for healthcare are being discussed on Provincial and National forums. One such strategy, widely tested almost all over the world—whether developing or developed—is the introduction of Health-Insurance Scheme to enhance healthcare services. A wide gap between apparent health-needs and available financial resources constitutes a source of both inefficiency and inequity. The cost of health-services offered remains close to that in the industrialized countries. This places great onus for alternative funding for the health-system, starting with

direct participation of individuals in the establishment of collective systems of protection.

2. IMPORTANT HEALTH-SECTOR ISSUES & CHALLENGES IN PAKISTAN

Pakistan has a large population of over 160 million people, and ranked 134th in the world on Human Development Index; 26% of its entire population lives below the poverty line. The priority challenges are (i) the control of communicable diseases, (ii) improving child and maternal health, and (iii) prevention and control of non-communicable diseases. Cost-effective interventions for controlling major diseases exist, but it is perceived that the financial and human resource-gaps and limited managerial capacity hamper the efforts to extend essential health-services to the poor.

Pakistan's health-sector is inefficient in terms of resource usage for program-objectives; ineffective in terms of producing a measurable impact on intended beneficiaries and inequitable, in terms of relatively benefiting urban areas rather than rural and disadvantaged communities. Following are the two important issues in the health-sector regarding service-delivery in the rural and disadvantaged communities that have been discussed in detail.

2.1 Non-Functional Rural Health-Facilities

The evidence on service-delivery also indicates lacunas at three tiers of delivery i.e. primary, secondary and tertiary. In the context of Pakistan, the functioning of health-facilities at primary-care level has been an issue that has been addressed to some extent through devolution of governance. However, mechanisms for the functioning of the new system still need to be supported by modalities of implementation. Secondary and tertiary levels are working with a huge burden of users, shifted from the bottom in the absence of a fully functional referral system. Therefore, the system has to work in a situation of severe resource-constraints. As a result, the Basic Health Unit (BHU) is not catering to the communities as per their expectations and needs. However, a situation of "pull and push" has been created in this regard. The users of BHU have been pushed to use private health-facilities, which are marred with high cost of care and poor-quality services, and mostly rely on asymmetric information. Many BHUs are closed because of non-availability of staff especially female health workers. Procurement and supplies are hampered by delayed centralized decision-making, and in other cases, due to lack of funds

and red tape. Therefore, provision of essential drugs has become a challenge at BHUs and RHCs.

2.2 Financing Healthcare

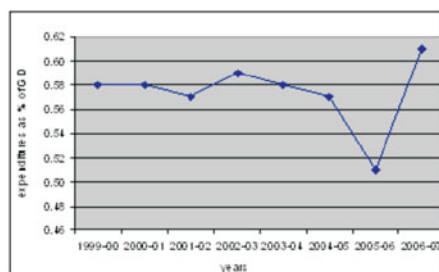
Financing of health-sector has posed challenges in different ways. Apart from the fact that overall health-financing constitutes a very small part of GDP that needs to be enhanced as per standards set by WHO's Commission on Macroeconomics and Health. It is notifiable that Pakistan is fully committed to the achievement of the MDGs and PRSP.

2.2.1 Expenditures on Public-Health

The expenditures in health-sector have increased remarkably to achieve the goals and targets in the health-sector. However, the level of investment in health, in spite of recent rapid increases in resource allocation by the government, is low and still requires more input.

Figure-2 shows that the expenditures in the health-sector have significantly increased from Rs. 24,281 million in 2000-01 to Rs. 50000 million in 2006-07. The health expenditures, as percentage of GDP, has also increased from 0.58% of GDP in 1999-00 to 0.61% of GDP in 2006-07 (Figure-1) (although it had decreased to 0.51% in 2005-06). The development budget has also increased in absolute terms, as well as the percentage of the total health-budget. In 2000-01, the development expenditures on health were 24.48% of the total health expenditures, which rose to 40% in 2005-06.

There is also an increase in pro-poor expenditure on health; it increased up



Source: Planning commission

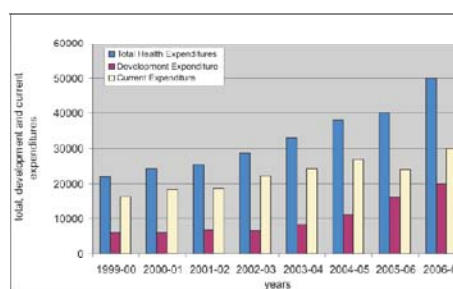


Figure - 2: Health Expenditures

Figure - 1: Health Expenditure as % of GDP

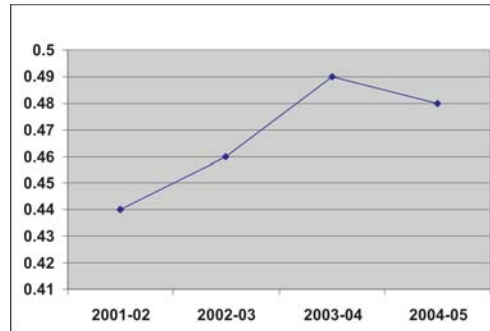


Figure - 3: Pro-poor Health Expenditure as % of GDP

to 0.48% of GDP in 2004-05 from 0.44% of GDP in 2001-02, showing an increase of 9.1% in 3 years. In 2003-04, it was 0.49% of the GDP, but slightly declined in 2004-05 (Figure-3).

2.2.2 Out-of-Pocket Expenditures

According to WHO estimates, the Total Health Expenditures (THE) in Pakistan are US \$ 18 per annum, out of which about \$14 are Out-of-Pocket Expenses (OPE). This is a very high ratio, as compared to other regional countries and speaks of an active private healthcare system.

The analysis carried out by analysts of National Health-Policy Unit (NHPU) and World Bank (WB) shows that income is the most important determinant, and the poor spend very little on health. This trend of low spending in lowest quintiles and high expenditures on health in the highest quintiles, is the same over all data-periods from 1992-93 to 2005-06. It is important to note that financial barriers are the main reasons for not seeking care for all groups, other than highest income group, and distance becomes less of an issue, the higher the income is (see Figure-4 & 5).

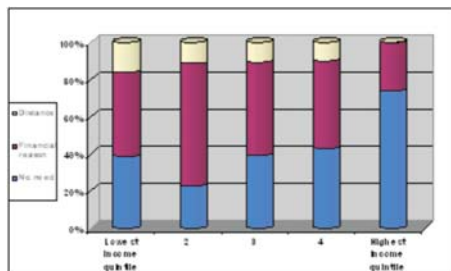


Figure - 4: Main Reasons for not Seeking Care

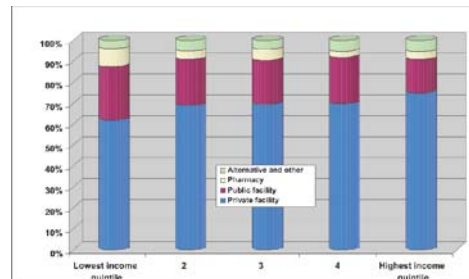


Figure - 5: Healthcare Seeking by Facility

Another important point to note is that all the income-groups seek care from private facilities and it has the highest proportion across all income groups, when care by type of facility is analyzed. Seeking care from private facilities ranges from about 63% to 74% (of total care) from lowest quintile to highest quintile.

2.2.3 Catastrophic Health Expenditures

Accessing health-services can lead to individuals having to pay large proportions of the costs, known as “catastrophic expenditure”; which can push many households into poverty particularly the transient poor. The protection of people from catastrophic payments is widely accepted as a desirable objective of health-policy.

According to the data from HIES/PIHS for the years 1992-93 to 2000-01, analyzed by WB and NHPU, catastrophic expenditures are more likely in rural areas, and lower-income households appear to be increasingly at risk of becoming poor due to health payments. As Figure-6 shows, the highest proportion of “likely to become poor” is for second lowest and lowest income quintile, which is 10.8% and 2.6%, respectively.

There is a need to initiate new programs and introduce appropriate systems in the health-sector, so that financial protection against catastrophic medical expenses, caused by illness and injury, can be coped with in an equitable, efficient and sustainable manner.

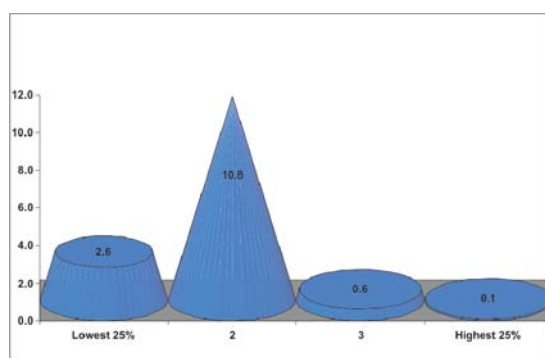


Figure - 6: Proportion of Individuals becoming Poor due to Health Expenditures

3. THE SOLUTION

To resolve the issues and address the challenges in the health-sector, the important facet is to revisit the healthcare policy and strategy. To revisit the strategy, ways are to be sought to have alternate sources of healthcare financing; to improve healthcare delivery system; to address management issues; to develop a need-based human-resource plan; to establish a result-based M & E System; to decrease the rural/ urban divide and to introduce and pilot-test the innovations.

The focus is on finding the solution broadly for two issues; (i) how to fill the resource-gap in health- sector and to seek the ways of alternative healthcare-financing; and (ii) how to make the non-functional BHUs functional, so that they can provide quality-services to the community without any bias. The chapter presents a model of alternative healthcare-financing and is presented, which suggests introducing and pilot testing the innovation in the health sector. *The proposed model for pilot test is “Community-based health-financing/ insurance, integrated with health information and communications-technology (e-health/ tele-health, HIT etc.)”*. Before discussing the model in detail it is pertinent to introduce and explain the concepts of alternate healthcare-financing, with special emphasis on community-based health insurance (CBHF/I) and telehealth, which are the basis of the model.

4. ALTERNATE HEALTHCARE-FINANCING

Health financing involves the basic functions of collecting revenue, pooling resources, and purchasing goods and services (WHO). The determinants of health-financing are indeed a complex blend of institutional, demographic, socio-economic, environmental, external, and political factors. We discuss these below:-

4.1 Sources of Healthcare Financing

Following are the potential sources of funds for healthcare:

4.1.1 Local Taxation

Several arguments have been put forward in favour of local taxation, like more transparency, improved accountability, responsiveness to local preference, and separation of health from competing national priorities.

There are also several counter-arguments, i.e., the domination of healthcare-spending in local budgets may generate inertia because local politicians are unwilling to risk change. Local taxes may also lead to horizontal inequity, if different tax rates are applied in different regions. Moreover, the same tax-rate may result in more (less) revenue for rich (poor) regions, according to the wealth of different regions. Finally, local taxation is more limited in scope.

4.1.2 National Taxation

Collecting taxes nationally has the advantage of economies of scale in administration. It draws on a broad revenue base; it allows trade-offs between healthcare and other areas of public expenditure. Funding healthcare through general taxation also means that allocation to healthcare is subject to (annual) public-spending negotiations; this politicizes the process.

4.1.3 Social Health-Insurance

Social health insurance is more transparent and, therefore, usually more acceptable to the public. However, social health-insurance has also some disadvantages i.e. employers are usually required to contribute part of the cost of social insurance, this can result in higher labour-costs and may reduce the international competitiveness of a country's economy. Coverage tends to be limited to curative and medical interventions and few, if any, public-health interventions. Social health insurance relies on a narrow revenue-base. Furthermore, wage-related contributions are less equitable. If social-insurance is not mandatory for the entire working population, it can create a perverse incentive for employers.

4.1.4 Private Health-Insurance

Private health-insurance can be classified as substitutive, supplementary or complementary. Private long-term care insurance has been recommended as a means of protecting against the risk of dependence in old age. However, research suggests that this insurance is likely to be inefficient. Transaction-costs tend to be higher under private health-insurance, due to considerable administrative costs. Consumer-information problems are also associated with defining benefits and setting premiums.

4.1.5 Medical Savings

Although medical savings-accounts have been extensively debated in the international literature, they have only been implemented in practice in Singapore and, to a limited extent, in the United States (more recently in China). In this system, individuals contribute a proportion of their income regularly to their account.

4.1.6 Formal Cost-Sharing/ User Charges

Proponents of user charges claim that such charges raise revenue to expand provision of health service. In fact, it depends on different assumptions about the elasticity of demand. Logically, increasing user charges reduces the utilization of health-services, it will not increase aggregate revenue. However, user charges often have undesirable effects on equity. User fees can lead to access problems or even exclusion of the poor from healthcare utilization; access problems cause a drop in utilization rates and eventually delays in seeking care which can result in prolonged and more expensive curative treatment. Moreover, under-utilization of health facilities will reduce the cost effectiveness.

4.1.7 Community-based Health-Financing

Such schemes may be especially needed in many low- and middle-income countries, where out-of-pocket payment for healthcare is high. The strength of CBHF lies in its possible use as an instrument of community empowerment. It implements existing community mobilization efforts by bringing the community together on an issue that affects all of them. The community is no longer a passive receiver of services, nor are members receiving it in their individual capacity. It strengthens the process of dialogue with the community. It also provides the opportunity and the forum to discuss about health and its causes; development; environment; social justice, etc.

4.2 Community-Based Health-Financing/ Insurance

Health financing models in developing countries are usually include:

- Universal Coverage
- Social Health Insurance

- Community-Based Health-Financing/ Insurance Schemes

In the health-sector, there is a need to increase financing options to: address the resource-gap; encourage public-private partnerships for access to new resources; increase community-participation and develop strategies to help implement effective interventions at the local level. And, in order to meet the critical challenges of inadequacy of social insurance, in its current form, to reach the poor, limited total expenditure for health and out-of-pocket expenditure as the main source of funding, the national and local governments have already begun to look at innovative approaches to financing the pressing healthcare needs. The examination of community-based health-financing as a potential mechanism for meeting healthcare needs is inline with recent trends. As the World Bank's Macroeconomic Commission on Health reported, "Community financing is effective in reaching a large number of low-income populations, who would otherwise have no financial protection against the cost of illness" (Jakab et. al. 2001).

Community financing can be broadly defined as any scheme that has three features: community control, voluntary character, and prepayment for healthcare by the community members. Characteristics of CBHF are:

- The community is actively engaged in mobilizing, pooling, and allocating resources for healthcare;
- The beneficiaries of the scheme have predominantly low income, earning subsistence from the informal sector (rural and urban); or socially excluded;
- The schemes are based on voluntary engagement of the community;
- The structure of resource-mobilization and benefits reflect principles of solidarity; the primary purpose of the schemes is not commercial (i.e. not-for-profit).

Community-based health financing schemes are reported to reduce the out-of-pocket spending of their members, while increasing their utilization of healthcare services. Community-based health-financing schemes, which involve risk-pooling and allow members to prepay for services, have been proposed as one way of reducing economic barriers to care, and, therefore, increase the utilization of health care services.

So far, the actual implementation of CBHF schemes has shown mixed results, with success and viability largely depending on design and management of the

scheme, community participation, and regulations at the level of the healthcare provider, quality of services and on the socio-economic and cultural context.

5. TELEHEALTH

The terms ‘Telemedicine’ and ‘e-Health’ are sometimes confused or broadly used interchangeably. Telemedicine normally refers to the practice of medicine or provision of medical services from a distance, while e-Health, broadly speaking, refers to the administration of health data electronically. The e-Health uses the modern information and communication technologies to meet the needs of citizens, patients, healthcare professionals, healthcare providers, as well as policy-makers. It also refers to health-related activities, services and systems carried out over a distance, for the purposes of global health-promotion, disease-control and healthcare, as well as education, management and research for health.

The term ‘Telehealth’ is often used to encompass a broader application of technologies to distance-education, consumer outreach, and other applications wherein electronic communications and information technologies are used to support healthcare services (videoconferencing, transmission of still images, etc.). The delivery of healthcare services, where distance is a critical factor, by healthcare professionals using information and communications technologies for the exchange of valid information for diagnosis, treatment and prevention of diseases and injuries, research and evaluation, and for the continuing education of healthcare providers.

Telehealth customarily uses two methods to transmit images, data and sound – either live, real-time transmission where the consulting professional participates in the examination of the patient while diagnostic information is collected and transmitted, or ‘store and forward’ transmission, where the consulting professional reviews data asynchronous with its collection.

It is also important to acknowledge a distinction – telemedicine is not a type of HIT. Certainly, telehealth is dependent on the use of telecommunications and related forms of advanced technologies, but it fundamentally describes the delivery of patient and consumer care. In some respects, the distinction reflects a difference between clinicians and the IT world. It is important that the differences be recognized, understood and accepted, so that telehealth and HIT can work together, in order to optimize the delivery of healthcare.

5.1 Telehealth in Pakistan

Telehealth can play an important role in areas of health development, including administration, tele-education & training, quality health and improvement in the efficiency of the healthcare delivery. Globally it is now being recognized that telemedicine & e-health can provide cost-effective & economical healthcare to underserved & rural areas. Telemedicine is also becoming an important means of emergency medicine & disaster medical management.

In Pakistan, there is a growing support from the policy-makers for e-health, telemedicine implementation and availability of funds from different institutional and ministerial sources within the country. Pakistan is pursuing a vigorous information- technology and telecommunication development policy, as well as plans with special emphasis on nationwide broadband infrastructure & access.

Telehealth was introduced in Pakistan in the late 90s. Currently, there are a few projects of telehealth including: TelMedPak in upper Punjab Province, at Taxila and in Northern Areas at Gilgit and further extended to Gujar Khan, Jhand, Pindi Gheb and Fateh Jhang; another project in Karachi by Preston Institute of Management, Science and Technology (PIMSAT); Telemedicine Network by connecting Jinnah Postgraduate Medical Center (JPMC) with a remote center in Shikarpur District in Sindh by Pakistan Space and Upper Atmosphere Research Commission (SUPARCO); as well as ICTs for Development by Commission on Science and Technology for Sustainable Development in the South (COMSATS) and International Development Research Centre (IDRC), for remote Northern Areas. In the year 2002, the first live tele-surgery was carried out at the Holy Family Hospital, in Rawalpindi, with the consultant connected via fiber optic at Serena Hotel in Islamabad.

Telehealth in Pakistan is gaining popularity, as a cost-effective and high-quality means of providing healthcare to masses. It seems that telehealth will become a means of efficient and equitable utilization of resources for better health of the people of Pakistan.

6. THE PROPOSED MODEL FOR CBHF INTEGRATED WITH HEALTH-INFORMATION TECHNOLOGY (HIT)

Low-income and middle-income countries, like Pakistan, are plagued with

three major health-policy issues:

- ▶ Mobilization of sufficient resources to finance healthcare;
- ▶ Utilization of funds in a manner to provide efficient service;
- ▶ Mechanisms to provide cost-effective healthcare.

Health financing systems in low- and middle-income countries rely on a mix of funding sources. This pattern has emerged as a result of low taxation capacities and the fact that no one source alone can generate enough revenues to provide health-services for the whole population.

Strategies must take into account the existence of social inequalities and a segmented health and social protection system. An intervention should be assessed, in terms of its impact on the distribution of risk, and measures should be taken to ensure that the very poor are not made worse off. Health and social protection strategies should be part of a broader effort to address risks and improve household well-being. Sometimes, it is appropriate to earmark resources for health; sometimes, the intervention should cover a number of risks. One important consideration is the need to avoid an unnecessarily complex mixture of interventions. Special programs are needed to meet the needs of the very poor. They can be based on a combination of targeting principles (disease, locality, household). Measures will be needed to ensure that resources reach the poor and are translated into effective services.

It is necessary to implement health and social protection strategies together. Demand or supply-side measures are unlikely to deliver effective protection, on their own. Mechanisms are needed to strengthen cooperation between government departments and private sector, with complementary responsibilities. Here, the purpose of the following model is to address the same issues mentioned above.

The proposed model to provide quality health services in the remote and rural areas of Pakistan and to pilot test is “Community based health financing/ insurance integrated with health-information and communication technology (e-health/ telehealth, HIT, etc.)”

The main objective of the scheme is equity, effectiveness and efficiency in providing the healthcare-services. Some specific objectives are:

- To provide sustainable healthcare to people;

- To contain healthcare costs, by making providers more accountable to the community and to the people for whom they are providing services;
- To increase the role of the individual families and the community, in taking the responsibility for healthcare services;
- To provide a mechanism for supporting preventive and community-based door-to-door health-services linking households with first level healthcare facilities.

6.1 Advantages of the Model

The advantages of this model include:

- Alternative forms of risk-pooling (informal sector)
- Reduce economic barriers
- Reduce out-of-pocket payment
- CBHF, as extending traditional arrangements
- Instrument of community-empowerment
- Community mobilization
- Combined/ collective voice
- Process of dialogue with the community

6.1.1 Evidence from other Countries

Econometric analysis of household data from various countries indicates that prepayment and risk-sharing through community-involvement in healthcare financing increases the access by poor populations to basic health-services and protects them to a limited extent, against the impoverishing effects of illness.

The Gonosasthya Kendra in Bangladesh is effective in reaching the poor. Out of the total destitute households in the area, 80 percent are covered by the scheme, including 46 percent of the poor, 20 percent of the middle class, and 10 percent of the rich, amounting to an overall subscription-rate of 27.5 percent.

A study in Chad has shown that access to community-based insurance-schemes (a modality of CBHF) can help to mitigate risks. In Senegal and Ghana, mutual health organizations (another modality of CBHF) have grown exponentially over the past three years, and this growing movement has caught the attention of national governments trying to craft

healthcare-financing policy and legislation. (Jakab et. al. 2001)

6.2 Components of Proposed Model

Following are some components of the scheme:

- Health-Card System
- Community-Based Health-Information System
- GIS based HIS
- Health records
- Medical records
- Referral system
- Telehealth consultations

Health-cards system has many advantages. Some of these include:

- Immediate access to patient's medical history: All the patients' medical history is stored onto the health card. Therefore, in case of an emergency, the card provides medical personnel with immediate and accurate access to the patient's medical condition.
- Large storage capacity: Health-cards store the patient's personal information, emergency contact, insurance, employment, allergies, medications, conditions, diseases, and immunizations.
- Cards can be changed or updated: Whenever change occurs in the patient's information, such as change of address, cards can be changed or updated instantly.
- Patients can be helped quickly and efficiently: The health-card provides data needed for treatment, if the patient is unconscious or unable to communicate.
- Small size, fits into any wallet or purse: Since the health-card is the size of a credit card, it can fit into any wallet or purse, so patients can carry a copy of their medical record wherever they go.

Community-based information systems enable building capacity and providing relevant information geared toward policy analysis, mobilization and allocation of resources, infrastructure development, emergency situations management, proactive planning, and improving community-access to services.

Here, another important distinction is to be made between the medical and

health records. An Electronic Medical Record (EMR), the electronic replacement of paper charts, is the record of patients' health-information generated by encounters at one particular provider. This is the physician's own electronic record of their patient's medical care. When a physician purchases software, he or she is purchasing an EMR system. While the Electronic Health Record (EHR) is a record of a patient's long-term and aggregate health-information generated by one or more encounters in any care-delivery setting, stemming from the interoperability of multiple providers, the EHR is distinct from the clinical systems that will directly support caregivers treating patients. Rather, the EHR connects the various clinical systems and providers. Included in this information are patient demographics, progress notes, problems, medications, past medical history, immunizations, laboratory data, and radiology reports.

6.3 Mechanism

- Health-cards could be sold in communities surrounding autonomous contracted/ leased RHCs, BHUs and MCH centers.
- The cards would entitle the holder to a basic package of primary and preventive healthcare services and a specific number of curative service incidents. The card would provide for primary care at the local facility and also referral care at a higher-level facility.
- The cards would be sold by citizens' community boards CCBs/or NGOs in the catchment area of the BHU or MCH center. The CCBs/NGOs would contract with the health facility to provide care for the health card holder.
- The CCBs/or NGOs would designate a certain number of households who could not pay for the services, so that these people could receive free cards, paid for from zakat or from provincial health budget. The destitute or poorest of the poor would be eligible for getting free cards from the financial pool by the scheme. In this way, this scheme has an in-built social security system.
- Funds would be pooled from every household in the catchment area, which would enable the fund to cover a number of referral incidents and the hospital-costs of catastrophic illness.
- Cards could also be sold in the community by the LHW, and these LHW would be supported by the CCBs/NGOs to provide preventive services and community-based door-to-door healthcare.
- The CCBs/NGOs would contract with the health-facility, on the basis of a pre-determined number of households, which were contributing to the fund. This scheme is inclusive of all households and on voluntary basis.

- This scheme would provide the telehealth services and would be based on a strong referral system. Mandatory referral-system is a pre-requisite of the scheme, to make it effective.
- The information-management system would be established to keep the records of the patients and the community, through electronic health cards

It would encourage health-facility managers to improve the efficiency of their facilities, provide incentives for more effective care and better treatment. The use of a prepaid health-system also empowers the community and gives them a stake in ensuring effective quality health-services. This type of system provides the basis for incentives for more effective care and better treatment. The organization will ensure the availability of drugs, doctors and paramedics to provide quality services.

6.4 Design

While designing these types of schemes, there are several interesting aspects; the focus is specifically on the following questions:

- How effective are community-based health financing schemes in providing financial protection for their members?
- Which modality of community financing performs better, in terms of resource- mobilization?
- Which modality is more inclusive?

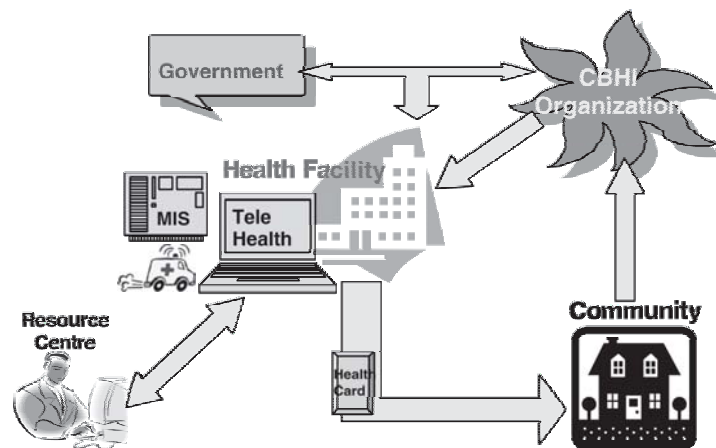


Figure - 7: Proposed Model for C.B.H.F. Integrated with H.I.T.

Therefore, the design and modality of the scheme will be according to the community where it has to be implemented. The modalities and design-issues can vary from community to community.

Health finance/insurance is no magic bullet to improve healthcare systems, though it can contribute to their effectiveness in case it helps to remove barriers to access to healthcare, which means that utilization of formerly under-utilized facilities increases and patients show up before it's too late.

6.4.1 Government's Role: Governments can play a critical role in promoting the good design and implementation of community-based health insurance schemes. The countries that have had most success in increasing coverage (such as China, the Republic of Korea and Thailand) have established clearly defined policy frameworks, have often developed specific operational guidelines and have frequently judiciously used government subsidies to encourage enrolment. Community-based health- financing schemes also have implications for the government's strategy for sector subsidy.

The development process itself stimulates direct action in the households through an educational process (environmental and reproductive health, prevention and immunization, school attendance, etc.), and also builds social capacity, as people in the community are part of the system. Community workers are trained in social and health matters and the personnel at the hospitals are trained in management and analysis data.

6.5 Advantages of CBHF integrated with Telehealth

Some important advantages of the scheme are:

- Reduction in out-of-pocket expenditures;
- It is a time-saving intervention (telehealth consultation will reduce the travel time which has to be incurred in absence of telehealth consultation);
- It is a cost-effective intervention;
- Specialized services can be provided to the community;
- It will help in community empowerment;
- Community database;
- Health Cards System;
- Community Based HIS;
- HER/EMR;
- This HIS can be linked with other MIS;

- Reduction of inappropriate referral and Reduction in catastrophic health expenditures;
- Accessibility and utilization would be increased;
- Quality of services can be ensured, through the organization that is maintaining the scheme;
- It will also improve the efficiency of healthcare delivery-system;
- It has inbuilt social security mechanism;
- It is an example of public-private partnership and will enhance further the public-private partnerships in the country;
- It will bear the one time capital cost to establish ICT infrastructure, then there will be cost of routine health-services (although the connectivity charges and specialist's fee will be there);
- Basis of other innovative and pilot programs/projects.

6.6 Innovation

The innovation and uniqueness of this scheme is that there are examples of CBHF, as well as examples of telehealth around the world and also in Pakistan, but this is the first time that both the ideas have been merged, to come up with one scheme that has both the components.

Telehealth integrated with CBHF is a unique model of its own kind, and needs to be tested in South East Asia and Pacific. This is very useful for remote and underserved areas in any part of the world, including Pakistan. It will also help in achieving targets of MDGs and PRSP.

6.7 Viability

Although the viability of the scheme depends on so many factors, including:

- Scheme design and management;
- Behaviour of healthcare providers;
- HH and community characteristics.

The success of CBHF is highly dependent on:

- Government's role;
- Involvement of the community;
- The types of medical services sought by members ;
- The fees paid for services, by the community;

- The fees that community members felt they were willing to pay for such services;
- The ability of the community to pay for services, through a prepayment scheme.

7 THE WAY FORWARD

The Action Research is needed to further develop the model and other such models. There is a need to design a project, through consensus-building that can cater for the needs of the community. The design could vary from community to community. Then the implementation is required and it can be done through pilot-testing. Lessons can be learnt from the monitoring and evaluation of the scheme.

8 CONCLUSIONS

It is evident from the above analysis of public expenditures in the health-sector that, even after the remarkable increase in the allocations, the funds are still not enough to cater for the essential healthcare-needs of the country. It is discernible that there is a need of more investment in health-sector in order to achieve the goals and targets of MDGs, PRSP, and MTFD. Fiscal space and sustainability are particularly serious constraints in low income countries, like Pakistan, and are the main obstacles to achieving the health-sector targets. While turning to the issues of universal health- coverage, financial-protection, and health system efficiency, there is a dire need of alternative health financing reforms. In this regard the only viable option is to explore the alternate sources of financing healthcare for efficient revenue mobilization and increased risk-pooling, to improve allocative efficiency, equity, and financial protection.

From the above analysis, it can be extracted that community-based financing, integrated with telehealth with the support of government, can be a viable option in Pakistan, and a pilot-testing project can be initiated, in this regard, for its validation.

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EXISTING EVIDENCE TO TELEHEALTH AND ITS SCOPE IN DEVELOPING COUNTRIES

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ABSTRACT

Telehealth has been around for over 10 years. A lot of projects have been carried out and many evaluation studies have been undertaken related to telehealth. The studies have been in the domains of user-satisfaction, economic benefit and clinical outcome. Meta-analysis and reviews on these studies have been performed to obtain an overall understanding of the evidence from the evaluations. The evidence has shown to have either mixed or negative results of telehealth. There is a need of further evidence to prove that telehealth is beneficial. At the same time, however, we should understand that the context and objectives of telehealth projects undertaken so far have largely been in the developed countries, which tend to be different from those of developing countries.

1. INTRODUCTION

Telehealth has been around for over a decade and a number of studies have been carried out to evaluate its various projects. The current evidence, however, does not unequivocally prove the benefits of telehealth. Infact Coiera (2003) points out that the current evidence paints a “mixed to negative” picture of the benefits of telehealth. In support of this, Coiera presents a Table-1 describing some of the key meta-analyses and reviews carried out to assess the impact of telehealth. These are large-scale reviews in the domains of: broad reviews, user satisfaction, economic analysis and clinical outcomes.

2. STUDIES & CRITICAL REVIEWS ON THE IMPACT OF TELEMEDICINE

Coiera (2003) writes that it became apparent in the broad reviews that most of the studies carried out were of low quality. In these, tele-radiology has shown some benefit. Tele-dermatology has been shown to be cost-disadvantageous to the healthcare providers, but not the patients. Satisfaction came out high in the user-satisfaction reviews, but then studies, too, had issues of design and

Table – 1: Summary of Key Critical-Reviews Examining the Impact of Telemedicine

REVIEW	NUMBER OF STUDIES	MAIN CONCLUSIONS
Broad reviews of telemedicine		
Roine et al. (2001)	50 of 1124 studies reviewed met the review criteria	<ul style="list-style-type: none"> - Most studies were pilot projects and of low quality. Some evidence for teleradiology, teleneurosurgery, telepsychiatry, echocardiogram transmission, electronic referrals, enabling e-mail consultations, video-conferencing between primary and secondary care. - Teleradiology can save costs.
Hailey et al. (2002)	66 of 1323 studies reviewed met review-criteria	<ul style="list-style-type: none"> - As above. Few papers considered routine use. Evidence for benefit in home-care and monitoring. - Teledermatology has cost-disadvantages to healthcare providers, but not patients.
User satisfaction reviews		
Mair and Whitten (2000)	32 studies reviewed	<ul style="list-style-type: none"> - Teleconsultation seems acceptable to patients in a variety of circumstances. - Methodological deficiencies limit generalisability of findings.
Williams et al. (2001)	93 studies reviewed	<ul style="list-style-type: none"> - Reported levels of satisfaction consistently greater than 80%, and frequently 100%. However many studies methodologically weak.
Economic analysis reviews		
Whitten et al. (2002)	24 of 612 studies reviewed met quality-criteria	<ul style="list-style-type: none"> - There is no good evidence that telemedicine is a cost-effective means of delivering healthcare.
Clinical outcome reviews		
Currel et al. (2000)	7 trials met selection-criteria	<ul style="list-style-type: none"> - There is little evidence of clinical benefits.

continue...

...continued

Hersh et al. (2001)	25 studies reviewed	- Evidence of clinical benefit limited to a few areas: home-based telemedicine for chronic diseases; surgical and neonatal intensive-care; patient-transfer in neurosurgery.
Hersh et al. (2002)	58 studies reviewed Few high-quality-studies.	- Strongest efficacy in diagnostic and management decisions in psychiatry and dermatology.

Source: Coiera, 2003

quality, with questionable survey-tools, small sample-sizes, low response-rates, no control-groups, and lack of comparison with face-to-face consultations. Similarly, studies and economic analysis were said to have issues of quality. The review of 612 studies given in the Table-1 concluded that there was no good evidence of cost-effectiveness of telehealth. The authors of the various reviews on clinical outcomes also reached the conclusion “that there is still only little evidence that telemedicine results in clinical outcomes that are comparable to, or better than, face-to-face care.”

3. ANALYSIS ON EARLIER STUDIES

While the conclusions drawn from the reviews of the studies are valid, there are certain points worth discussing, particularly in relation to the developed vs. developing country notion for telehealth. The first point to be noted, with regard to the evidence above, is that the vast majority of the studies were undertaken in developed countries where formal health-services, to a greater or lesser extent, exist almost everywhere. Therefore, telehealth was mainly being assessed as an alternative means to deliver healthcare, primarily driven by the need to control and reduce costs. In developing countries, however, the situation is completely different. There are many areas, remote or not so remote, that do not have any or adequate healthcare services. The only hope of people living in these circumstances for any sound medical advice could be telehealth. Hence, the need for telehealth in developing countries has a different basis, which could result in a more positive impact, if telehealth services are analysed in these settings.

The second point to be noted is that the main deficiency in the evidence has resulted from low quality of the studies. While more robust studies could

further demonstrate the lack of benefit of telehealth, it could potentially also provide proof to the contrary. Because there is room and need to test telehealth projects in developing countries, they might be the right locations for further research, in order to generate new evidence in a new context. The research, however, needs to be carefully planned so that it produces valid and reliable results.

4. TELEHEALTH PROJECTS IN PAKISTAN

There are already some telehealth projects underway in developing countries. Pakistan is one of the countries where there are a number of telehealth projects, linking remote healthcare facilities in the high mountains of the Himalayas with tertiary and teaching hospitals in Islamabad. These projects, however, have mainly focussed on providing specialist clinical advice between two hospitals. While these projects, and others like these, are important, what really needs to be looked at is the provision of telehealth services at primary-care level. There is a large proportion of people who live in a deprived state, where there is no provision of healthcare-services, whatsoever, and quacks and traditional healers are the best they get. If health-services can be provided to such people through telehealth, it will certainly be an invaluable achievement that will serve the cause of humanity.

5. RECOMMENDATIONS

In summary, the future vision of telehealth in developing countries needs to focus on:

- a. Research:** This needs to be undertaken to investigate the benefits/value of the existing telehealth projects and assess its impact. Should these studies produce positive results, research would be further required to explore gaps in existing telehealth projects/services in order to improve them further. It is, however, important to plan research carefully to ensure it generates valid and acceptable results.
- b. Primary care:** It is important to establish this, in order to ensure that basic healthcare is provided to those people where no healthcare is available. This is where the gap lies, and this is the main area with which the expectations of telehealth are linked. In order for this to materialize, it in turn needs to be ensured that modern sophisticated technology (the usefulness of importance of which is recognised) does not become the sole

focus of telehealth. Sometimes the less sophisticated technologies are more relevant and viable (especially in a developing-country setting) than the expensive sophisticated ones. It is, therefore, important to bring the entire range of telehealth-technology tools on board, to choose the best ones for any given situation; one common, simple, cheap and important tool that is worth considering, on its own, is the telephone (land line or mobile).

- c. Development of policies related to telehealth: Policies in healthcare become imperative after initiatives/services are accepted and are taken up for implementation. This ensures that the initiatives/services remain safe, promote health, deliver a certain standard of outcome, are used appropriately and to its maximum potential, and processes and procedures related to it are efficient.

6. CONCLUSION

It is, however, possible that the impact of telemedicine demonstrated in developing countries, shows a different picture; telehealth projects in developing countries might be important opportunities to generate new evidence in a new context.

Telehealth is gaining wider recognition and is expected to gain further implementation in developing countries. It is, therefore, becoming a growing requirement to start thinking of, and working towards, the development of policies related to telehealth in the setting of developing countries as well as to conduct appropriately designed studies and analysis to capture the true picture of impact. The fate of telehealth/telemedicine projects are expected to be different. The masses in developing countries are to gain more from telehealth/telemedicine projects.

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SECTION-C

SOME EXPERIENCES IN TELEHEALTH

POTENTIALS FOR THE FUTURE OF TELEHEALTH AND EXPERIENCES IN BALTISTAN

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ABSTRACT

To those not familiar with our healthcare initiative in Baltistan: I assisted my late wife, Dr. Nasima Rahman, a Pakistani medical doctor to build up healthcare services since 1989, particularly for women and children. My services were first with a clinic, training, medical field-camps and a school health program, in Skardu, and since 1997 in Khaplu, District Ghanche. We (BHEF) took over in 2003 the management of the Abdullah Hospital of the Jabir-Bin-Hayyan-Trust at Skardu, where we established a telehealth facility 2004 (with the technical assistance of COMSATS) and financial assistance of the Canadian development agency, the International Development Research Centre (IDRC) our Telehealth Clinic. The initiative has been fairly successful and beneficial for the people fo remote rural population. It has also led us to new learning and experiences making way for even better service quality and opportunities to explore.

1. INTRODUCTION

The Hospital sees an average of 100 OPD-patients per day, while our satellite-clinics at Khaplu (100 km to the East) and at Gamba (10 km to the West at Skardu Airport) another 40. During our initial learning period in Telehealth, we attended to a total of around 2,000 patients till now, mostly dermatology patients, which seems to be also the technically easiest to handle with the transmission of images of the patient's skin via digital camera and micro-camera, besides interview of the patient by the dermatologist. As there is no dermatologist in the entire Northern Areas of 1 million inhabitants with a harsh climate and often unhygienic living conditions, this served as a much needed intervention.

Looking forward to the benefits of being able to provide the consultation of medical specialists, locally not available to the people of Baltistan, we were initially concerned about the possible pitfalls, like technical as well as patient-

doctor quality of communication, reaction of patients, particularly women being filmed, protection of privacy in consultation, cost/sustainability. In our context, we were naturally more interested in distance-consultation, than other aspects of telehealth like public health management, patient- & clinic/hospital data-management or health-education and staff-training although we are looking forward to include these in our program.

2. PROCEDURE AND EXPERIENCE

Overcoming gradually the initial technical difficulties, of quality of transmission and suitable software for patient-data management, we are now reaching the point where we can comfortably demonstrate reasonable, although not flawless, quality of consultation and patient-data management. One requires a minimum 128 kb fully dedicated bandwidth, or better DSL-connection, for video-communication, particularly as in our case for live on-line telehealth consultation; but this is less important for a store-forward link-up. We were provided Polycon, as well as a digital videocamera for video-connections instead of simple web cameras. One interesting attitudinal aspect found was the medical consultants' persistent preference for on-line video-consultation, which requires a much higher bandwidth, instead of simple patient-file shuttle to study, communicate via messaging or only-voice connection, and send a diagnosis with advice - all of which they could have done from a suitable PC-Internet connection from anywhere, instead of visiting COMSATS' Resource Center for each consultation.

To enable a faster downloading of patient-information on both sides, which will speed-up the medical consultants' access to patient-files, as well as for the doctors at our Hospital and future connected clinics, COMSATS is presently setting up a web-portal for storage of patient's data, instead of downloading them from a COMSATS' Server. This will also enable us to integrate/network both, the data of patients visiting the doctors at our healthcare facilities, and the ones being referred to, or seeking telehealth-consultation in, our database.

Moreover, presently it is the IT-Assistant at our Hospital, who most of the time assists the telehealth consultation at the patients' side. A medical doctor or para-medic would be preferable, but they are too busy at the time with the patients visiting our hospital, since it is the only time the medical consultants are free to visit the Resource Center at COMSATS. The ideal process in future will be, that the patients' file is sent to the web-portals' database by the distant GP/clinic, including initial examination/x-ray/ultrasound/photo/video-

images/lab-test, etc., made accessible only by the medical specialist concerned, at a time of his/her choice; questions asked, more tests recommended, than either discussed with the GP, online or messaging, or with the patient, if necessary, also by video-consultation, but as a matter of last choice, as it blocks time and bandwidth of the system.

3. EXPERIENCES AND SUGGESTIONS FOR THE FUTURE

We found no shyness or hesitation even in female patients for posing in front of the camera for consultation, while the consent-form, translated into simple Urdu from a complex medico-legal form in English, was found too cumbersome, but on which we will have to insist in the long run. Presently, there is little awareness about data-privacy, even privacy during normal consultation, but for access to the new web-portal and during consultation we have to work out a secure privacy-standard. We tried also for telehealth-patients to fill out a patient-satisfaction form, but we are operating in a largely illiterate society in Baltistan, and only a few forms could be filled.

To inform the public about the availability and benefit of telehealth, we invited the local medical doctors, Govt. officials, media persons and NGO-representatives for demonstrations of telehealth and spread the news via local radio & TV. However, the recent evaluation showed, that few people seemed to understand the term 'telehealth', and now, as transmission-quality has improved and more patients can be handled in a day and session, a new publicity campaign needs to be undertaken. The uncertainty due to hitches in the quality also restrained us so far from using the distance-video-communication for training purposes, but a multimedia room is already in place at our hospital for this purpose. Further we have yet to calculate the cost-benefit ratio of the technology in financial terms, but we estimate that the initial cost of about Rs. 2,000/- per patient has come down to about Rs. 1,000/- and, as the cost of technology and connectivity is gradually coming down, and the number of patients which can be handled at a time is going up, the cost per patient will come down to about Rs. 200/- plus fee for the medical consultant. Bringing a medical specialist to such remote locations is surely more expensive. Thus we are optimistic and plan to extend our tele-health program, by linking our satellite clinics at Gamba & Khaplu, as well as the collaborating Marafie Hospital in Mehdiabad/ Kharmang, all situated along the newly laid optic-fibre-cable of SCO, and offering the service to governmental hospitals in the Rondu and Shigar valleys. This would increase the coverage enormously; but still many of the poor living in far flung mountain villages can't even afford to travel down to these places.

4. EXTENSION TO NEGLECTED AREAS AND LOW-COST TECHNIQUES

The Shigar valley, 150 km long and with a population of 50,000, has presently only 2 Govt. & 1 NGO doctor, the Rondu and Kharmang valleys of similar size and population face the same situation. To provide them better healthcare, we are presently examining the potential of consultation with the help of mobile-phones with in-built camera, with trained paramedics taking the blood-pressure, glucose, ante-natal, pregnancy & other tests, and managing the phones at the patient's side and another linked to a PC & monitor at the doctor/clinics' side. This may allow for voice, as well as visual consultation via GPRS connection, sending of x-ray and ultrasound images to the radiologist at our hospital, as well as stethoscope sounds to the doctor. Mobile-phone coverage with GPRS connection via tower-coverage or via satellite will be the critical factor. Mobilising the required human resources and their posting at remote locations is another difficult task, but it will be easier than posting medical doctors there. *Improved communication, including transport, is the key to improved access to affordable healthcare, but special care needs to be taken to prevent unethical use of these diagnostic and communication facilities.*

5. CONCLUSION AND FURTHER WORK

- A. We are already in the process of setting up a Baltistan Medical Helpline with the assistance of Telenor, one easy number, providing or linking to information for first-aid, general health-care information, the nearest healthcare facility or transport for the caller, appointments or ordering medical supplies, and mobile-phones with separate numbers for the ambulance, our drivers, health-centers and doctors.
- b. Further we plan to link-up with the Health Dept. for a public-private partnership in HMIS (Health Management Information System), as presently only 30% of all patients are reported via HMIS, which covers presently only the Govt. primary healthcare facilities. Mobile-phones can be used for reporting public health information, from healthcare facilities to the District, and preventive healthcare information to the public.

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TELE-HEALTH: A SUCCESSFUL EXPERIENCE IN NORTHERN AREAS OF PAKISTAN

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ABSTRACT

COMSATS, an international and intergovernmental development organization, is the pioneer in Pakistan in the field of telehealth – the unique tool to provide healthcare when distance and time are a great challenge. Since 2001, COMSATS has been involved in initiating multiple telehealth ventures in different parts of the country, including the remote, cold and long neglected Northern Areas of Pakistan. These ventures have been most successful on both grounds – technical and cultural.

COMSATS' accomplishment of telehealth services is a major milestone in the provision of healthcare in a developing country like Pakistan especially while considering that, firstly, these projects were implemented in difficult terrain and weather conditions; secondly, the technical infrastructure was initially nonexistent; and thirdly, and most important of all, in an environment of extreme conservatism. Despite all odds, COMSATS' battle against poverty, disease and illiteracy carries on.

1. TELEHEALTH – THE NEW HEALTHCARE REALITY

As technologies and their applications have expanded, so has the conceptualization of the place of technology within health and within society as a whole. The broadening impact of technology is reflected in the changing definitions and models. Telehealth can be defined as:

“The use of information and communications technology to deliver health-services and exchange health-information when distance separates the participants.”

Telehealth is a refined concept, which encapsulates various healthcare services. The major application of Telehealth is telemedicine, which is confined to providing clinical services to the needy. The term ‘telemedicine’ is gradually going out of favour and being replaced by ‘tele-health’. Earlier, most

telemedicine services comprised provision of consultation by medical doctors, using the medium of telecommunication to bridge the distance. Then, the transfer of medical information was the immediate goal of such a service.

With the increasing involvement of non-medical professionals in the provision of healthcare, the term 'tele-health' came more in use than before. It describes this useful expansion beyond the confines of clinical medicine. Although experience and changes in practice are at the root of this shift, it has been accelerated by falling costs and increased access to equipment, as well as by more general facilities, such as the Internet.

Further definition of Telehealth can be: *“the use of information and communication technologies to transfer healthcare information, for the delivery of clinical, administrative and educational services”*.

A more thorough definition of Telehealth was given by World Health Organization in 1997, which states:

“Telehealth/telemedicine is the delivery of healthcare-services, where distance is a critical factor, by healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of diseases and injuries, and for the continuing education of healthcare-providers, as well as research and evaluation, all in the interest of advancing the health of individuals and their communities”.

The scope of Telehealth, as given in the above definition, is extensive. It may include provision of administrative healthcare information that recognizes the use of telematic services to transfer demographic and operational information that may have little or no clinical content. Similarly, while distance-learning courses for healthcare professionals are covered by the banner of tele-health, components of these courses may concentrate on health-policy or other non-clinical topics.

Considering the above definitions, the applications of Telehealth are practically limitless. It perfectly addresses the problems where distance, time, geography and cost are barriers to effective healthcare services. Present-day technologies now greatly help in improving the effectiveness and efficiency of clinical as well as health-educational services. The applications of Telehealth range from monitoring health from homes, providing clinical/diagnostic

services in battlefields, marginalized and remote areas, to providing healthcare information and education through virtual means for the large interest of public health.

2. COMSATS' JOURNEY IN TELEHEALTH, NOVEMBER 2001: STARTING OF FIRST TELEHEALTH PROJECT BETWEEN GUJAR KHAN AND ISLAMABAD

Telehealth is a major ray of hope for the developing countries and their most remote areas. Initially, all developing countries have to struggle with a variety of pilot-scale projects and the difficulty of getting those projects to an operational status. It is a fact that telehealth has been critical in bringing positive benefits to the overall healthcare-system of any country.

Health, in particular, emerges as one of the key components in the process of development. One third of Pakistani population lives below the poverty-line, with little or no access to basic human rights, thus, giving rise to illiteracy, unhygienic living conditions, poor health, and insecurity of food and water. Pakistani people, especially women and children, suffer from both infectious and chronic diseases. According to Agha Khan University, in terms of infant mortality rates, Pakistan ranks 157th in the world, while the child mortality-rate ranks 39th, reflecting a very high mortality experience. Majority of the population lives in rural and remote areas, which are underprivileged in terms of access to basic healthcare services.

In 2001, COMSATS initiated a pilot-scale project in the field of telehealth in Gujar Khan. Within a year, COMSATS gave medical consultancies to more than 1000 people, through dialup Internet between Gujar Khan Clinic and COMSATS' Islamabad Resource Center. This was a learning experience for COMSATS and provided the strength and will for future telehealth endeavours on larger scales.

COMSATS' Gujar Khan project proved to be a trigger to launch yet another project in the field of healthcare in Skardu in 2004. First, an extensive infrastructure (including the internet and satellite link) was established.

3. BACKGROUND OF THE SKARDU TELEHEALTH PROJECT

The Northern Areas (NAs) cover more than 72,000 Sq Km, on Pakistan's northeastern frontier with Afghanistan, China and Indian-held Kashmir. NAs

have a population of 1.5 million living in more than 600 villages. It is one of the most mountainous regions in the world, with 19 peaks higher than 7600 meters; more than half of the area is above 4500 meters above sea level. About, 42% of its area is covered by mountains and 52% by range lands. Natural forest-cover is only 4% and agriculture land a meager 1%. The Northern Areas are administered directly by the Federal Government, through its ministry of Kashmir Affairs and Northern Areas (KANA). It is organized into 5 administrative districts (Gilgit, Skardu, Diamer, Ghizer, and Ghanchi). The whole area was a remote and untouched region till the opening of Karakoram highway between Pakistan and China in the early 1980s. The overall literacy rate in the Northern Areas (NAs) is estimated at 15%. The health-status in Northern Areas is generally very poor. Women in the NAs live under very difficult social, cultural and economic conditions, bound by religious and cultural norms, burdened with all sorts of household and farming responsibilities. Their lack of education (less than 1%), poor health and lack of access to medical facilities further exacerbates their vulnerability.

Northern Areas of Pakistan have difficult terrain, extreme climate and geographic remoteness from the large metropolitans. Baltistan and Hunza, particularly, do not have access to quality healthcare services. Specialists are virtually nonexistent. Major hospitals are located at a great distance, for instance Gilgit is about 800 kms away from a tertiary healthcare facility. Also, the rural health-centers are not linked to the hospitals in urban centers, resulting in loss of precious lives and complication of diseases, especially among women, children and the elderly.

Keeping in view the deteriorating condition of the Northern Areas, COMSATS took the initiative of launching telehealth services in the Northern Areas of Pakistan. A project with the name 'ICTs for Rural Development of Remote and Mountainous Areas of Northern Pakistan' was initiated in January 2004. Its overall objective was to facilitate alleviation of poverty, improve access to specialized health-services and IT education and, thereby, contribute towards raising the standard of living in the focused areas.

Baltistan Health and Education Foundation (BHEF), founded in 1990, which has been working to mobilize healthcare-services for women in the remote and backward regions of Baltistan, has collaborated with COMSATS to implement and make the first such project in the area a success. International Development Research Centre (IDRC), the Crown Corporation of the Government of Canada, is the principal funding organization. Introduction of

telehealth-services in the Northern Areas of Pakistan has provided a breakthrough for a large section of the population.

3.1 Objectives of the Skardu Telehealth Project

- To provide access to relevant information, through ICTs and the Internet, for the remote population living in Northern Areas
- To reduce the isolation of healthcare-providers in rural communities, through the expansion and enhancement of the videoconference network, which provides educational and clinical services
- To reduce cost of travel for patients and providers
- To increase access to clinical consultative services and Health-Education programs and provide supervisory expertise that would not otherwise be available to rural communities
- To provide a feasible and sustainable system of consultations, using telehealth via video-conferencing
- To provide easy access to multidisciplinary and specialty supervisory personnel

4. INITIATION OF THE SKARDU TELEHEALTH PROJECT

COMSATS is now about to complete its third year of telehealth services to the Northern Areas, particularly Baltistan. It is worthy of mention that it required a cultural change. In a short period of time, of almost three years, the telehealth service now is well-established and the concept of telehealth is well-accepted by the local communities. Building rapport with the local people, convincing them to adopt telehealth services and interact with people who did not belong to their community, as well as disclose their privacy, especially in the case of women, was an uphill task. Within a span of a few months, however, COMSATS' team was successful in bringing about a change in the attitudes of the local people.

The lack of adequate infrastructure in the region was a major challenge in implementing the project. The government had installed landlines in some villages during the last decades. It is of poor quality and of high cost for the end-user. The only ISP in Gilgit was established by COMSATS.

For infrastructure, COMSATS Internet Services (CIS) was delegated the technical tasks including: establishing an ISP setup at Skardu; capacity building of Gilgit node; training and orientation of project staff; operating and

managing an ISP at Skardu; assisting and giving consultation to the project for procurement of technical equipment/machinery, and reporting and documenting the technical aspects of the project. Successful implementation included obtaining the license from the local telecom organization - Special Communication Organization (SCO), to operate an ISP in Hunza.

A VSAT link between Skardu-Islamabad and Hunza-Islamabad was established with an initial link of 128Kbps. Internet bandwidth is being provided from Islamabad to Gilgit and the same has been done at Hunza and Skardu, and COMSATS has assured subsidized rates for the project. CIS is working with licensed Data network services providers for the most cost-effective and efficient system. Further more, with the establishment of an ISP at Skardu, the capital being generated is being invested in the operating cost of the ISP as well as the cost of telehealth services.

4.1 Initial Targets for the Skardu Telehealth Project

- To test run the tele-consultations and identify the difficulties and flaws in technical as well as operational procedures
- To provide health benefit in the form of specialist opinion to the local community through live tele-consultation
- To develop and implement the Standard Operating Procedures (SOPs) for doctors and paramedical staff
- To set up an Internet Service Provider (ISP) and upgrade the existing technical infrastructure to implement the telehealth project

4.2 Challenges Successfully Overcome

- Licensing to operate ISP in the Northern Areas of Pakistan
- Procurement of suitable and tailor made equipment for tele-consultation
- Internet Bandwidth for ISP to facilitate TeleHealth
- Mobilizing the Medical Specialists & their Orientation Training
- Establishment of fully equipped Tele-Health Center
- Store & forward Technique and Live Interactive Consultation (Video Conference)

4.3 Needs Assessment and Feasibility

During the first phase of the project, basic needs assessment was done at Skardu. In order to develop standard operating procedures (SOPs) and to

synchronize the efforts between Telehealth Centre (Skardu) and Resource Centre (Islamabad), the following issues were tackled: level and type of medical services, availability of medical specialists, service scheduling, necessary and desired medical equipment, both suitable and compatible with ICT infrastructure and clinical medical requirements. The three major spheres of focus were: i) Designing and establishing telehealth-center, ii) Inducting team of medical specialists, and iii) Identifying, selecting, and developing/procuring ICT-compatible medical equipment.

Initially it was noted that telehealth services should be provided in the fields of General Medicine, Cardiology, Gastroenterology, Dermatology, and Nephrology. Except for nephrology, services in all other fields are not being provided. Initially it was planned that the asynchronous (store and forward) method would be implemented more frequently than the synchronous (live) method for the telehealth services. Later on, as the telehealth services were used more extensively, the synchronous method, quicker in service, was often used.

It was necessary to have time-tested proven video-conferencing equipment at both the telehealth center (Skardu) and resource-center (Islamabad). It was considered best to establish the telehealth center within Abdullah Hospital in Skardu, run and operated by the collaborating institution – Baltistan Health and Education Foundation (BHEF). The hospital is a secondary-level healthcare unit.

It was decided to compensate the specialists, on each visit basis, to resource-center, and not on the basis of number of patients. The study on the modalities of medical equipment compatible with information communication technologies (ICTs) was done.

4.4 Launch of Telehealth Center

The establishment of a fully functional telehealth center at Skardu comprised the following activities:

- Five medical specialists and a Telehealth consultant were hired at Islamabad.
- Telehealth consultancy-services were operated for a test-phase and, later, ran as part of formal services for patients in Skardu.
- Training, orientation and development of healthcare personnel at Abdullah

- hospital was carried out.
- Development of Patient Information Management System (PIMS) was completed.
 - Networking and linkages with experts, donor and medical organizations was established.

More than 300 patients received specialist consultation in the first three months of Skardu telehealth project's operation, with exponential increase in the number of patients in the later months. The patient statistics showed that dermatologist's consultancies were in high demand. Women greatly benefited from the service, and showed confidence and satisfaction.

4.5 Operation Telehealth Center

The number of telehealth consultancies provided increased in number over the months. Till July 2007, more than 2,500 consultations were carried out. Teleconsultations have continued, as scheduled, since the time of launching of services back in April 2005, i.e., one work-session a week for dermatology, cardiology, gastroenterology, nephrology and general medicine. However, observing the influx of patients, the idea to conduct nephrology sessions was dropped and dermatology session was doubled, to meet the demand. The services were reduced for some time after the strong earthquake of October 2005. It luckily did not hit Baltistan region; however, it made the specialists at the resource-center (Islamabad) unavailable for Telehealth for most of the consultations in the following month and a half.

The level of trust and confidence of the community, as a whole, seemed to have grown, as indicated by the steady number of follow-up cases, as well as with the significant number and percentage of females benefiting out of this service. Telehealth activities ran successfully, despite difficulties arising, at times, due to connectivity, infrequent availability of general practitioner (GP) at Skardu, and difficulties in data-transfer.

The target set at the start of the project of providing 1,000 consultations was achieved during the month of May 2006. This milestone was achieved, despite reduced services during the mid and later part of October and early November (2005). Women and children (between the age-brackets of few months to below thirteen years) remain the main beneficiaries of Telehealth services. Women account for 61% and children 21% of the total population that received specialist medical consultation from doctors in Islamabad. Firstly, they find it

difficult to travel on their own to tertiary-care centers in far flung areas, and secondly, because it costs more to travel since they are dependent on male family members to accompany them due to societal and cultural norms.

Another fact that indicated the acceptance of the service was that, people from rural areas were pouring in to receive specialist consultation in equal percentage (in comparison to people from urban Baltistan), despite the fact that no massive promotional campaign was run. Word of mouth and the community in Baltistan, being closely knit, were the main reasons for such a trend.

4.6 Connectivity

Low bandwidth and distorted connectivity were the major impediments to better Telehealth services. Weather conditions and physical damage to copper wires also slowed down the link all the way from one end to the other, i.e., from Resource Centre at Islamabad – VSAT – Skardu - ISP – to Telehealth Center Skardu.

Measures taken to overcome these issues are:

- The videoconferencing system was tuned to make the calls at 128k to minimize packet loss while achieving improved audio quality.
- Separate downlink services were arranged from another service at ISP in Skardu to make VSAT link bandwidth available.
- The graphs of bandwidth usage obtained from the ISP identified the time when the internet usage was minimum and, therefore, the timings for consultation were adjusted accordingly so that maximum bandwidth should be available at the time of consultation.
- An alternate cable link was made available so that it can be used as a backup/alternate in case of any damage to the main link.

4.7 Human Resources

Infrequent availability of general physicians or well-trained paramedic staff has been one of the major issues during the telehealth service at Skardu. Most of the doctors prefer to go to a large metropolis. Paramedics are also rare in the area and very few of them are acquainted with telehealth. The following steps were taken to cope with this issue:

- A doctor dedicated to the telehealth service at Abdullah Hospital Skardu was employed so as to present accurate and detailed data of the patients (patient history, basic physical examination, etc) to the specialist doctors. It was preferred that a female doctor is hired to serve a large number of female patients through telemedicine. The doctor was guided and supervised by the specialists themselves according to their own requirements. All the specialists opined that the quality of consultation is satisfactory when there is a supporting doctor (general physician) present at the remote site – Skardu, to provide the basic data.
- The computer operator, who is responsible for running the remote telehealth centre, has gained a lot of experience through hands-on-training method. He was formally supervised by all the doctors at telehealth centre and resource centre, which helped him to gain expertise in delivering services. The computer operator is now able to take a good relevant patient history, do general physical examination, e.g., checking blood pressure, pulse, temperature etc., in the absence of a general physician at the remote centre.

4.8 Patient-Information Software

The patient information software has proved to be of vital help in maintaining the medical records of patients. With the passage of time and operations it has been realized that a web-based solution is needed to render similar services from various sites. Development of web-based telehealth portal is in progress.

5. RECOMMENDATIONS

- In areas that are less developed and lack basic facilities, it is more practicable to utilize telehealth technologies that are relatively inexpensive, robust (do not break down) and are easy to operate and repair.
- Activities must be chosen that result in a high-degree of benefit for as many people as possible, while the technology chosen should be compatible with the immediate healthcare needs.
- To have healthcare intervention in marginalized areas, the private sector and local organizations should be persuaded to come forward in planning and implementing the telehealth services.
- The participation of local organizations will not only help in developing healthcare services attuned to the local settings, but will, also facilitate the acceptance of these services in the area.
- The successful collaboration of COMSATS and BHEF for telehealth in the

remote mountainous northern areas of Pakistan has underscored the need to have a local organization, be it a community-based organization (CBO) or a non-governmental organization (NGO), in order to catalyze operations and implementation, have effectiveness in service delivery, and to bring a sense of ownership in the community.

- The key to successful telehealth-services is the management information system (MIS) deployed. It should be devised, in accordance with the medical practices of the local specialist medical doctors and general physicians, who usually team up to deliver the telehealth services.

6. CONCLUSIONS

Telehealth is a viable solution to provide not only specialist consultative services but also support other healthcare-services for the people of the developing countries, particularly the remote regions. Telehealth can also be used to improve the access of the healthcare-providers of these regions and break their isolation.

The COMSATS telehealth services initially seemed an uphill task and many of the problems were difficult to cope with, yet, with the team effort and enthusiasm of all the persons involved, the project has become a reality. People, especially women and children, benefit a lot from this service. Those who are unable to go to urban cities, to get specialist advice, now have local access to specialist healthcare. Economy can be achieved by using digital cameras or newer versions of web cam (instead of specialized videoconferencing equipment), which provide high resolutions and low pixels.

Finally, the general public, patients and health-professionals should be educated and informed, as much as possible, about telehealth so that they are comfortable with this method. All stakeholders must be assured that the existing healthcare-system will not be completely replaced by telehealth; rather telehealth is to supplement the overall system.

MAKING E-HEALTH BORDERLESS: EXPERIENCE OF TELE-RADIOLOGY LINK BETWEEN AGA KHAN UNIVERSITY, KARACHI, AND FRENCH MEDICAL INSTITUTE FOR CHILDREN, KABUL, AFGHANISTAN.

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ABSTRACT

The paper discusses an e-Health based project that is implemented at a tertiary health facility, the Aga Khan University Hospital, Karachi, Pakistan, as well as at the French Medical Institute for children, Kabul, Afghanistan. The fact that e-health can benefit people across geographic boundaries and have radiology services can be provided through the means of telecommunications are presented in the paper.

1. BACKGROUND

Aga Khan University Hospital (AKUH) is one of the most prestigious institutions of health care and education in Pakistan. With its base in Karachi, AKUH is currently providing quality health care and diagnostic facilities all over the country. AKUH has currently developed partnership with French Medical Institute for Children (FMIC), which is an 85-bed pediatric hospital in Kabul, being run under a partnership between the French and Afghan governments, the Aga Khan Development Network and La Chaîne de L'Espoir, a French humanitarian organization.

The primary aim of this project is to provide access to the quality diagnostic services to healthcare providers in Afghanistan, thus improving care for their patients. These diagnostic facilities will include radiology, Pathology and other clinical services. As a first step, the project uses state-of-the-art broadband technology and wireless video consultation and digital image transfer to provide teleradiology services. The project also represents an important collaborative effort between Pakistan and Afghanistan to address regional health care needs.

Using modern technology and communications linkages, Cisco and Roshan have created a partnership with Aga Khan University Hospital , Karachi (AKUH, K) through which CT Scan and X-ray images can be diagnosed, interpreted and treatment suggested from Karachi. A combination of fiber-optic and radio-link is used to transfer images from FMIC to AKUH. The reports are sent back to FMIC in less than 24 hours.

2. INTRODUCTION

Aga Khan University Hospital (AKUH), Karachi is the leading tertiary care hospital in Pakistan, and is accredited by International organizations, such as Joint Commission International Accreditation (JCIA) and ISO-9001:2001. AKUH has currently developed partnership with French Medical Institute for Children (FMIC) in Kabul, Afghanistan. FMIC is an 85-bed pediatric hospital in Kabul, being run under a partnership between the French and Afghan governments, the Aga Khan Development Network and La Chaine de L'Espoir, a French humanitarian organization. FMIC also provides a range of outpatient and diagnostic services to patients of all age-groups. One such service is CT-Scans, which is available in very few other hospitals in Afghanistan.

Afghanistan faces severe shortage of qualified physicians and nurses due to

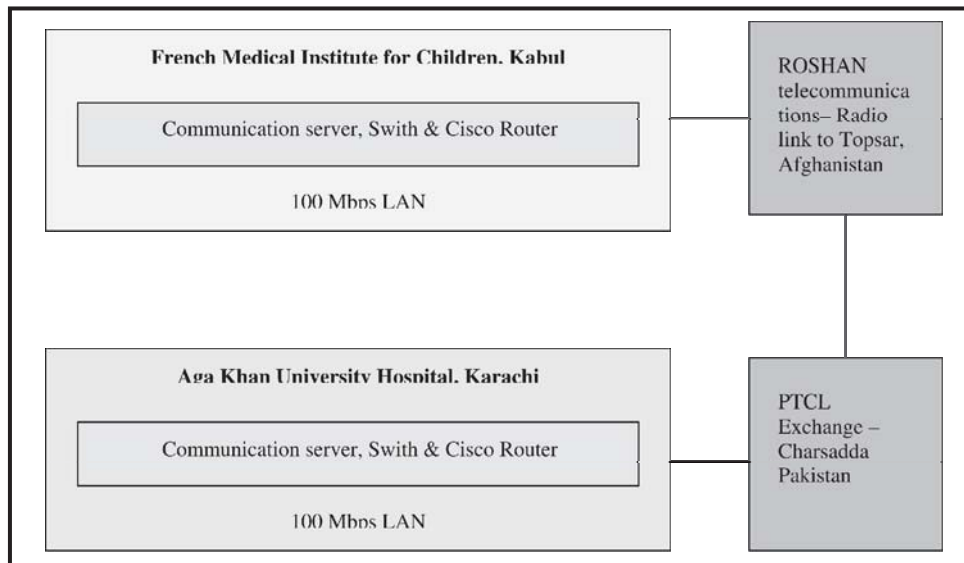


Figure - 1: Communication Link between AKUH and FMIC

years of conflict and existing security situation in the country. Most of the specialists working in the hospitals do not possess post-graduate degrees. Many of them also lack experience working in peace conditions, and dealing with cases other than trauma. There is a severe shortage of nurses and midwives in the country. Lack of quality institutions to train doctors, nurses and other health professionals, also magnifies the situation. This shortage exists with radiologists as well, which makes it difficult to read CT-scans at FMIC. For this reason, a dedicated link was setup with AKUH to send CT-Scans to Karachi, and get the reports back to Kabul.

3. OBJECTIVES

The primary aim of this project is to provide access to the quality diagnostic services to healthcare providers in Afghanistan, thus improving care for their patients. These diagnostic facilities will include radiology, pathology and other clinical services. As a first step, the project uses state-of-the-art broadband technology and wireless video consultation and digital image transfer to provide teleradiology services. The project also represents an important collaborative effort between Pakistan and Afghanistan to address regional health care needs. Technology: Following technologies are being used for the teleradiology link between FMIC and AKUH.

3.1 Technology at the Remote end (FMIC)

A Single Slice Spiral CT Scanner at FMIC is being used to capture images at FMIC. A new 16-slice CT scan is in the process of purchase. The studies which are needed to be reported from AKUH, Karachi, are saved separately on the communication server in FMIC. CT is connected through FMIC Hospital LAN 100Mbps to Communication server. Images are stored in a server with 3.00 GHz processor and 2GB ECC DDR2 hard-disk.

3.2 Technology at the Hub (AKUH, Karachi)

Server in AKUH, Karachi is connected through hospital LAN (100Mbps) to a Switch which then connects to 2800 Series Cisco router. The router connects to the AKUH PABX using 2 Mbps bandwidth. The server queries and retrieves DICOM image files that are placed in FMIC communication server. ROGAN View Pro Version - 2.0 software provides the facility of DICOM compatible study view on dual head 3MP monitors.

3.3 Technology Used to Transfer Information between FMIC and AKUH

Using modern technology and communications linkages, Cisco and Roshan, a leading GSM service provider in Afghanistan, have created a partnership with AKUH, Karachi through which CT Scan and X-ray images can be diagnosed, interpreted and treatment suggested from Karachi. A combination of fiber-optic and radio-link is used to transfer images from FMIC to AKUH. The reports are sent back to FMIC in less than 24 hours.

4. CONCLUSION

This project is unique in its kind and demonstrates unlimited benefits of e-health. The technology can be used in future to serve diagnostic, therapeutic and educational purposes between the two countries.

ROLE OF SATELLITE COMMUNICATIONS IN TELEMEDICINE DURING BAGH EARTHQUAKE IN PAKISTAN

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ABSTRACT

The effectiveness of emergency, diagnostic and pre-operative telemedicine during disaster-relief operation is the major field of interest discussed in this paper. An example of the effectiveness of telemedicine is given, to emphasize the role telemedicine can play to bridge the gap between the tertiary-level healthcare setups and the primary-healthcare facilities.

This paper highlights the role played by the remote telemedicine units in supplying the expert medical consultation during the post-disaster rehabilitation and medical follow up of the patients.

1. INTRODUCTION

International Telecommunications Union (ITU) provided 40 Inmarsat satellite-modems to the Government of Pakistan during the Muzaffarabad earthquake of October 2005. 15 modems were provided to Telemedicine & e-Health training center at Holy Family hospital, Rawalpindi. Mobile Telemedicine Units were set up in NWFP Province and Azad Kashmir. These were the areas worst hit by the earthquake. Remote telemedicine mobile set ups were stationed at Shohal Najaf field hospital Balakot NWFP, Hattian Bala and Muzaffarabad in Azad Kashmir to cater for the emergency and diagnostic medical needs of the affectees of the disastrous earthquake. Equipment used was an IBM notebook, INMARSAT Satellite IP modem, webcam and digital camera. A short training was given to persons conducting this study at the e-health training center at Surgical Unit-II, Holy Family Hospital, Rawalpindi. This is a unique experience of the role of Mobile Telemedicine Units in the wake of disasters. Results of experience at Balakot—a study of 28 patients are included in this paper who presented themselves at the Shohal Najaf field hospital. All these patients were provided with Teleconsultations and the referred cases were sent to the tertiary hospitals, after doing a complete work

on laboratory reports and initial preparation for the surgeries. Their stay in the hospital was minimized and speedy treatment was ensured.

Mobile Telemedicine set up was provided to Cuban medical teams operating emergency relief-camp in Hattian Bala. This experience of complementing emergency relief-work with mobile Telemedicine units is extremely valuable and can easily be replicated and the unit deployed on urgent basis in the wake of disasters.

The earthquake that struck Pakistan on the morning of October 8th, 2005, left behind widespread destruction, with loss of lives of approximately 80,000 people. It severely injured about 70,000 and left almost 2.8 million people without shelter. More than 100,000 patients were treated and /or airlifted to 70 hospitals in the neighboring areas for treatment.

Telemedicine is the use of electronic information and communication-technologies (ICTs) to provide and support healthcare when distance separates the participants. The use of telemedicine can speed up diagnosis and therapeutic interventions, by allowing primary healthcare providers to receive continuous assistance from specialized centers. This is especially important for emergency medical response, where time is of essence to save lives. During major disasters this can be critical, as a small amount of time saved can be life-saving for the patient. Final-year medical students of Rawalpindi Medical College (RMC), International Islamic University (IIU) and GIK institute volunteered to set up mobile telemedicine centers in the disaster-hit areas. They were based in the Field-Hospital at Shohal Najaf, near Balakot, and were



Figure - 1: Inmarsat Satellite-Modems

provided with a mobile telemedicine unit.

2. MATERIAL & METHODS

The mobile telemedicine unit comprised an IBM notebook, INMARSAT Satellite IP modem, webcam and digital camera. The Inmarsat satellite-modems, as shown in Figure-1, were provided by International Telecommunications Union. Intensive short telemedicine training-course for the volunteer was conducted at the Telemedicine and e-health training center in the Surgical Unit-II, Holy Family Hospital, Rawalpindi. The training modules consisted of basic introduction to telemedicine, establishing satellite connectivity, use of telemedicine software and a 'hands on' training session at the e-health training lab. The base-camp was set up at Shohal Najaf near Balakot, and linked up with Holy Family Hospital, Rawalpindi, for seeking

Table - 1: Groups of Consultations

Total	Orthopedic	Medicine	Other
28	12	7	9
	43%	25%	32%

advice for patients by mobile telemedicine unit. Teleconsultations were organized at the remote site. Other tasks carried out were coordination of relief and rescue efforts of field and tertiary-care hospitals. The mobile telemedicine volunteer's teams also collected data about requirements of these

Table - 2: No. of Patients (i) Treated Locally, or (ii) Referred to Tertiary Hospitals

Total	Locally treated	Diagnosis altered	Referred
28	10 (36%)	6 (21%)	12 (43%)

field hospitals. They coordinated with UAE Army Relief-Hospital, Bessiam, PAIMA field hospital and Ministry of Health Field Hospital at Gari Habibullah. This information was shared with agencies monitoring the relief efforts from Rawalpindi and Islamabad.

3. RESULTS

28 patients, who were provided teleconsultations at the mobile unit at Shohal Najaf field-hospital, are included in this study. The break up of group of consultations sought is shown in Table-1.

Majority of the patients had multiple injuries. Table-2 indicates the number of



Figure - 2: Boy Having Fracture Due to the Shaft of the Femur

patients treated locally at the field-hospital and those referred to tertiary hospitals, in consultation with specialists at Holy Family Hospital. This ensured prompt treatment at the tertiary-care hospital, thus minimizing hospital stay.

The mobile team also rescued an 11-year old boy during field-visits of a village in the earthquake-struck area. He had sustained multiple injuries, when the roof of his school collapsed. He had obvious fracture of the shaft of the femur (Figure-2) treated by make-shift splints. (Figure-3). The boy needed an urgent orthopedic consultation. All the relevant-information was sent back (using



Figure - 3: X-ray of Bone Fracture

specialized software) to the main telemedicine server, where consultation with an orthopedic surgeon was made and treatment options were discussed. The patient was shifted to the D.H.Q Hospital, Mansehra, and had internal fixation of the fracture.

4. DISCUSSIONS

Multiple technologies are utilized to accomplish complex tasks during disaster-situations(1,2,3). Recently many countries have developed applications of telemedicine to deal with disaster emergencies(4,5). Telemedicine applications aim to provide quality healthcare-services to people in geographically and environmentally inaccessible places. Telemedicine was first applied in disasters during the mid 1980s(6). Pioneering projects illustrated the potential benefit of the telemedicine system and emphasized the need to institutionalize such capabilities, nationally and internationally, so that these could be activated on demand. The national aeronautical and space administration (NASA) first used telecommunication technologies to furnish disaster-aid, following the devastating earthquake of 1985 in Mexico City. The US-USSR space-bridge project was employed after the Armenian Earthquake in 1988. The project used satellite communication to provide clinical consultation to several Armenian regional hospitals, linking them to four US medical centers. When hurricane Hugo devastated the Virgin Islands in March 1990, the Alabama Army National Guard's Mobile Army Surgical Hospital (MASH) was deployed to St. Croix. They used the prototype battlefield computed radiography scanner, a digitizer and an international maritime satellite (INMARSAT) terminal in order to transmit images acquired in the Virgin Island via satellite to Walter Reed Army Medical Center (WRAMC), in Washington DC, and to Dwight D. Eisenhower Army Medical Center in Augusta Georgia. This effort was to demonstrate the value of deployable teleradiology system in times of crisis.

Earthquakes are disasters of unique nature, in the sense that these not only cause damage to human life and social infrastructure, but also leave a huge population which needs long-term follow-up relief action. This long-term follow-up is usually not possible in the hospitals that are over whelmed in the days of such disaster situations. Telemedicine can help in managing trauma-patients at remote health-centers, after their initial management. This creates room for new patients.

5. CONCLUSIONS

The diagnostic and therapeutic value of telemedicine is now an established fact. This has been put to use in the past decade, on regular basis, both during normal and disastrous conditions. The multiple task-experience by mobile telemedicine team in disaster-hit area of Balakot had stressed the fact that a telemedicine center can act as a dynamic multipurpose center in a disaster-hit area and can efficiently provide multiple services, in addition to rescue and relief activities.

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