Project Planning for Regional Health and ICT Research Network PAN-Asia

IDRC-CRDI Project # **103360**

Consultant's Report

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Main Messages [1]

Where we are:
- IDRC is committed to assessing the value of their investment in e-health (ICT in health) related initiatives, and continuing this investment through research networks as appropriate.
- Recently funded e-health initiatives in Asia had not been independently assessed to determine their potential value, and the appropriateness of proceeding with a regional research network.
- This study addressed these issues by assessing 11 IDRC funded e-health related projects in 6 Asian countries, and relating the findings to a future strategy.

What were the findings?
- Of the 11 funded projects that were visited and reviewed, each could be considered to have demonstrated some value.
- The value seen was not always overt, maximized, nor of clear benefit to either IDRC or local communities.
- Several common shortcomings were identified which should be addressed in any planned Asian e-Health Research Network.
- Evidence of utility of project solutions [sustainability, scalability, or transferability (or such *potential* for incomplete projects)] was scant.
- Performance of structured evaluation, or measurement of discrete outcomes, to demonstrate value to IDRC or local communities was absent, or poor if present.
- As a consequence of the above, there was little formality or rigour in strengthening the evidence-base for application of e-health solutions in Asia.

Lessons Learnt:
- Evidence of value is desired, but value to IDRC or individual projects differs, and requires clear description of an evaluation framework and provision of guidelines from the outset.
- Transfer of e-health knowledge and skills for local and regional growth and application is desirable to establish sustainable, scalable development and application of relevant e-health solutions of proven value.
- A structured approach to IDRC's e-health investments in Asia is desirable to maximize local e-health development and benefit to IDRC and the Region.

Moving forward:
- Development of a regional thematic network will bring focus, stability, and cohesive direction, development, and assessment to IDRC's e-health activities in Asia.
- Structuring of this thematic network must include support mechanisms in defined areas (e.g. needs assessment, evaluation, outcomes, knowledge translation and transfer); this will lead to development of local skill and solutions, and a sound evidence base.
- With such support mechanisms, the regional thematic network will inform and influence options, directions, and consequences associated with e-health development, policy, strategy, and application in Asia.
- Funding of an e-Health focused Regional Thematic Network – PANACeA [2] – is recommended.

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[1] The format adopted for this report aligns with that recommended by CHSRF. (CHSRF. Reader-Friendly Writing — 1:3:25. Available at: http://www.chsrf.ca/knowledge_transfer/pdf/cn-1325_e.pdf (last accessed 14 November 2006). This indicates that for maximum utility and impact, reports should be formatted with 1 page of Main Messages, up to 3 pages of Executive Summary, and up to 25 pages of report. Multiple appendices can be attached for reference.

[2] PANACeA = *PAN A*sian *C*ollaborative for *e*vidence-based *e*-health *A*doption and *A*pplication.

Executive Summary

Background:
This report, the second of three components of an IDRC RSP, draws upon an evaluation of eleven IDRC supported e-health (health and ICT) initiatives in Asia, with additional perspective from the authors experience and additional activities in other countries. Based upon the findings, a conceptual framework and methodology for a regional thematic research network - PANACeA (*PAN A*sian *C*ollaborative for *e*vidence-based *e*-health *A*doption and *A*pplication) - is presented. This framework emphasizes methodologies to assess benefits and outcomes of e-health projects to IDRC and the region, and reflects regional variation in research capacity and development needs vis-à-vis e-health programs.

In conjunction with the scoping component of the RSP (a separate activity), the reports will provide scope and limitations to guide a Project Design Team (PDT) as they plan for development of a Pan-Asian e-Health Research Network. This network is expected to achieve several goals that will further the contribution of IDRC to future development and application of e-health solutions in Asia. Currently, e-health tends to focus on 'developed world' solutions that benefit 20% of the world population, and neglect the remaining 80%. The potential contribution of an IDRC Pan-Asian e-Health Research Network is great. Who is better placed than members of PANACeA to understand local need, see the potential of e-health, and transform or design a technology that provides a simple, inexpensive, scalable, broadly applicable e-health solution to the local or regional environment, and to then assess it within the Asian context?

Objectives and Results:
This study had five primary objectives, which encompassed assessment of current IDRC and other e-health related activities, identification of individuals and institutions as potential collaborators or mentors, identification of regional health issues, and recommendations for the a proposed regional thematic network. Each is briefly described below.

Objective 1. Review and evaluation of PAN's existing e-Health projects.

A systematic approach was taken to answering this study objective. Each IDRC funded project site was visited, and a published tool adapted to examine the benefits to IDRC of each e-health grant or project, as well as the benefits perceived by each local e-health grant or project team.

These site visits were very illuminating. They provided important understanding and perspective that was not gleaned from reading the individual proposals or reports for each study. The dedication and sincerity of each group and of each individual met during the site visits was clear and admirable. Further, project teams clearly perceived benefit from their e-health initiative. But speaking with individuals led to questions about the larger relevance of some projects, their absolute contribution to solving local health needs, and the likelihood of introducing their e-health initiatives as sustainable, scalable, and transferable solutions. Although each project can be said to have provided value, it was not clear that this value was aligned with the larger goals of IDRC or that the value extended beyond individual projects or immediate locales.

Specifically, six types of potential benefit to IDRC from each project were assessed: 1) Knowledge production - any type of publication; 2) Research targeting, capacity building, and absorption - follow-on research; training of staff; 3) e-Health solution adoption or integration - expansion or adoption of their e-health solution; 4) Informing policy - policy documents; meetings with government officials; 5) Broader community, institutional, or country benefit -

including social and economic benefit; 6) Health benefits to individuals or the population - more effective healthcare. On a scale from Low to High, projects were ranked as Low, Low-Medium, or Medium for most of the above criteria, and all received a Low ranking for 'health benefits'.

Comparing projects (cross case analysis) showed several common themes. Deficiencies in these themes had negatively impacted essentially all of the projects. These included: Lack of planning for a sound, strategic *health needs assessment*, lack of planning for *sustainability* of (proven) solutions, lack of consideration for and mitigation of *change management* issues, lack of sound *evaluation* planning or execution, limited or no *dissemination* (formal or informal) of findings, and no significant or structured *knowledge translation and transfer* to influence *decision- or policy-making* around future e-health implementations. Any future Asian e-health research network must address each of these in some manner.

In addition, several general issues came to light which also will need to be addressed. These included considerations around application software (i.e. open source versus proprietary solutions), application focus (e.g. use of traditional versus more novel technology such as GIS or m-health tools), and local e-health knowledge and expertise (i.e. need for skill transfer and capacity building).

Objective 2. Identify national needs and areas of opportunity and risk.

Internet searches were conducted to identify secondary data describing national health related needs and potential risks associated with pursuing e-health initiatives for selected Asian countries. The findings are summarized in Appendix V. In regard to national health needs the findings were not unexpected. While many Asian countries remain focused on addressing specific communicable diseases, and handling ongoing issues (safe water, hygiene, healthcare delivery), many are also having to contend with 'Western' non-communicable diseases (obesity, heart disease, diabetes) and issues (smoking).

Consideration of opportunity or risk was addressed through assessing the relative 'readiness' of countries to engage with e-health initiatives. The rationale was that investment by IDRC in e-health initiatives would have the greatest opportunity for success and least risk of failure if focused on countries identified as most 'ready' to benefit from such work. Readiness was assessed using a tool developed by InfoDev which categorizes countries as those most likely to benefit from development and implementation of applications versus infrastructure. Thus, Afghanistan, Bangladesh, Bhutan, Cambodia, Iran, Macao, Maldives, Mongolia, Mynamar, Nepal, North Korea, Sri Lanka, Timor-Leste, Vietnam were considered most ready for infrastructure initiatives; Hong Kong, India, Japan, Malaysia, Philippines, Singapore, Thailand for application initiatives; and Brunei Darussalam, China, Indonesia, Lao PDR, Pakistan, South Korea for a mixture of infrastructure and application initiatives. Balancing this systematic approach is the need for IDRC to invest broadly, and promote intra-regional collaboration between those countries 'more ready' and those 'less ready', to the mutual benefit of all partners.

Objective 3. Identify active e-health researchers in selected countries

To facilitate capacity building and e-health adoption achieved through the Network, it is desirable to identify individuals from the lesser developed South Asian and Southeast Asian countries to participate in the network.

Again, Internet searches revealed little in terms of existing and demonstrated e-health activities, although four individuals were identified with ability and interest in e-health research. All eleven

of the previously funded groups indicated willingness and interest in participating in a future Pan-Asian e-Health Research Network, and were identified as potential network participants. Regrettably, not all groups or projects would fit within a wider strategic regional e-health research initiative.

Objective 4. Identify potential lead institutions and researchers in Asia

To further facilitate capacity building and e-health adoption achieved through a Regional Thematic Network, it is desirable to identify individuals or institutions from Asia who could act as mentors for members of the network. Internet searches were able to identify a total of 69 institutions in 15 countries where some evidence of interest in e-health solutions was available.

Objective 5. Recommendations.

Using the findings, information, and perspective gleaned from the above activities, the final objective was to provide recommendations to IDRC and support for the activities of a Project Design Team. This report provides 10 recommendations regarding the potential scope and limitations of an e-health and research focussed Regional Thematic Network, as well as a proposed conceptual framework and methodology by which the networks activities might be guided and evaluated.

Conclusion:

IDRC has significant experience in the design and application of Regional Thematic Networks. In order for IDRC fulfill its planned engagement in the application of ICTs to the health sector, building on this prior experience and success is an appropriate direction to pursue. It is recommended IDRC fund an e-health and research focused Regional Thematic Network in Asia, and it is proposed the network be identified as *PANACeA* (*PAN Asian Collaborative for evidence-based e-health Adoption and Application*). Developing *PANACeA* will bring focus, stability, and cohesive direction, development, and assessment to IDRC's e-health activities in Asia. To maximise impact, PANACeA must include a variety of support mechanisms in defined areas identified through this study (e.g. needs assessment, evaluation, outcomes, knowledge translation and transfer), which will develop local skills and solutions, and the desired evidence base. As a result, findings from PANACeA e-health initiatives will - in an evidence-based manner - inform and influence options, directions, and consequences associated with e-health development, policy, strategy, and application in Asia.

1. Introduction

1.1 Terminology

IDRC typically refers to "ICT in Health" for health related development activities that adopt use of ICT's (information and communication technologies). However, many international agencies and governments of developed countries now understand and support the larger concept of "e-health". Furthermore, the WHO Resolution of 2005 [3] now extends use of, and encourages adoption of, this term globally. In addition, it is increasingly accepted that e-health is comprised of telehealth (telemedicine) and health informatics activities. It is important to be aware of this broader relationship and associated terms, which have been adopted throughout this report. Details concerning terminology are provided in Appendix I.

1.2 Geographic Regions

For consistency the UN Classification system has been adopted (Table 1). For the purposes of this study, focus was given to IDRC e-Health Projects and R&D grants in Southern, South-Eastern, and Eastern regions of Asia. Specifically, site visits were made to IDRC e-Health initiatives located in Pakistan, India, Nepal, Mongolia, Philippines, and Indonesia.

2. Study Rationale [4]

In the current IDRC Prospectus (2006-2011), PAN identified four focus areas under the technologies theme: rural livelihoods, education, governance, and health. Of these, health is considered the area where ICTs could have the most direct and positive impact in helping to improve the lives of Asian communities [5]. However, the first generation of largely donor driven "telemedicine" projects was generally a failure or proved to have a marginal impact on people's health. Indeed, many of the technologies previously developed and tested were too expensive to be widely adopted in resource-poor settings.

Through the advent of more pervasive technologies, such as mobile phones and Personal Digital Assistants (PDA), a new generation of health applications have come about that have actually made a proven difference. More research is needed to gauge which of these applications and projects best match local needs, understand why they have or have not been successful, and when warranted, try to scale them up to sustainable solutions. The fast pace of innovation in this area means that there is also a need for testing new applications, particularly in the area of demographic surveillance of disease incidence and medical compliance, using new technologies such as mobiles.

Building on PAN's positive experiences in implementing regional thematic networks on localization (PANl10n) and distance education (PANdora), which are among PAN's most successful activities, PAN will focus most of its support for health and ICT research through a regional network modality. Experience has shown that networks can ensure greater knowledge sharing, have more scope for research activities, enable greater capacity building through peer support and mentoring and generally show more administrative resilience.

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[3] World Health Organisation Resolution on e-Health (58th Assembly; 25th May 2005).

[4] Adapted from IDRC's RSP

[5] Chetley A. et al.. Improving Health, Connecting People: The Role of ICT in the Health Sector in Developing Countries. Published by InfoDev, May 2006. Available at: **http://www.infodev.org/en/Publication.84.html**. (last accessed 10 November 2006)

PAN will continue to utilize its traditional method for fostering networks, which entails PAN identifying ideas and partners through its PAN Small Grants program and subsequently linking them together regionally. Since 1998 PAN RnD Grants have supported eight small e-health grants. Additionally, PAN has supported three projects on e-health.

For this current IDRC initiative, three related activities have been funded within a single RSP (a scoping study, an assessment study, and a project design workshop), each of which is required to build a regional network with Canadian collaboration on e-Health. This report addresses only the assessment study, which was performed through a grant to the Global e-Health Research and Training (GeHRT) program of the Health Innovation and Information Technology Centre (HiiTeC; formerly the Health Telematics Unit), University of Calgary. The findings will support the subsequent design and development of a regional thematic network for e-Health, which will be undertaken by a Project Design Team (PDT) led and administered by Dr. Ruben Umaly of Angeles University in the Philippines with Canadian collaboration through the University of Calgary.

It is anticipated that the outcome of this current study will be development of a Pan-Asian e-Health Research Network. In turn, this network is expected to achieve several goals, including:
- Development of a body of evidence that serves to better understand which technological innovations are best suited to contribute to the solutions of the development problems in the areas of health;
- Creation of a thematic network of e-health researchers and practitioners in health, who are active in sharing knowledge and developing innovative e-health applications in these areas;
- Design and evaluation of innovative e-health applications that help solve development challenges; and;
- Increased ability of researchers and practitioners in Asia to find solutions to the existing health challenges through the use of e-health.

3. Existing PAN e-Health (Health and ICT) projects

Since 1998 the PAN RnD Grant program has supported eight small grants on e-health (Table 1). Additionally, the PAN program has supported three project grants on e-health (Table 2). For convenience, the projects have been presented and will be described by RnD Grant or Project Grant, and therein by country (in alphabetical order: India, Indonesia, Mongolia, Nepal, Pakistan, Philippines).

A site visit was made to the primary location of the organisation, but in addition it was made possible by local contacts to visit some remote or rural sites where project activities were taking place (Table 3). The generosity of primary contacts and project teams in making arrangements for, and participating in, meetings was truly impressive, and is gratefully acknowledged.

4. Study Design and Methods

4.1 Study Goal

The ultimate goals are to collaborate with leading researchers and institutions in Asia on the development and documentation of a proposal to IDRC for a regional (Pan Asian) e-Health Research Network project, and develop recommendations for Canadian collaboration with the University of Calgary to support this initiative.

	Table 1. PAN Funded e-Health *RnD* Grants						
	ID	**Title**	**Site Visited**	**Contact**	**Organisation**	**Funding ($ -USD)**	**Timeline **
India	I	ICT Enabled Life Skill and Sexuality Education for Adolescent Girls	Chennai	Ms. K.R.Renuka	Centre for Women's Development and Research	8,911	Jun 04; 12
	II	Using ICT to build capacities of HIV/AIDS Service Providers in India	Chennai	Dr. L. Ramakrishnan	SAATHII (Solidarity and Action Against The HIV Infection in India)	29,786	Nov 04; 12
Indonesia	III	Development of ICT-Based Telemedicine System for Primary Community Health-Care in Indonesia	Bandung	Prof. Dr. Soegijardjo Soegijoko	Biomedical Engineering Program, Department of Electrical Engineering, Institut Teknologi Bandung (ITB)	29,479	Jul 05; 24
	IV	Development of ICT-Based Mobile Telemedicine System with Multi Communication Links for Urban & Rural Areas in Indonesia	Sukabumi	As above	As above	29,479	Jul 05; 24
Nepal	V	Telemedicine in Nepal: a pilot project	Kathmandu and Biratnagar	Dr. Mohan Raj Pradhan	HealthNet Nepal	30,000	Jun 04; 24
Pakistan	VI	Information & Communication Technologies (ICTs) Assisted Learning Tool for Deaf in Pakistan	Karachi	Mr. Sabahat Saeed Khan	Sustainable Development Networking Programme, Pakistan	28, 500	Nov 02; 12
Philippines	VII	A Community-based Child Injury Surveillance System: Rapid Data Collection Using (Short Messaging Service (SMS)	Makati City	Dr. Alvin Marcelo	Medical Informatics Unit, College of Medicine, University of the Philippines	22,642	Jan 04; 9
	VIII	M-DOK: Mobile Telehealth and Information Resource System for Community Health Workers	Marikini City	Ayedee Ace Domingo, MD	SynapseHealth Solutions, Inc.	29,784	Jun 05; 12
* Time line: Planned Start Date (mmm/yy) and Planned Duration (months)							

Table 2. PAN Funded e-Health *Project* Grants							
	ID	**Title**	**Site Visited**	**Contact**	**Organisation**	**Funding ($ -USD)**	**Timeline** *
Mongolia	IX	ICT's for Health Services in Rural Mongolia (# 101226)	Ulaanbaatar and Saishand	Dr. Amir Amarsaikhan	Postgraduate Institute Health Sciences University of Mongolia	278,700	Jan 03; 24
Pakistan	X	101054 ICT for Rural Development in Mountainous and Remote Areas of Northern Pakistan	Islamabad (Gilgit by videoconference)	Dr. Hameed Khan	Commission on Science and Technology for Sustainable Development in the South (COMSATS)	717,707 (Cdn)	Jan 04; 24
Philippines	XI	102248 Technology-Supported Distance Non-Formal Training and education in water, sanitation and hygiene (Philippines)	Makati City	Dr. Angelo Ramos	Molave Development Foundation, Inc	257,180 (Cdn)	Jan 04; 24
* Time line: Planned Start Date (mmm/yy) and Planned Duration (months)							

Table 3.Site Visit Itinerary (Study ID; Country; Location)							
	Sunday	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
August 13-19th		Transit	Transit	X. Islamabad, Pakistan	X. Islamabad, Pakistan	VI. Karachi, Pakistan	Karachi, Pakistan
August 20-26th	Transit	I. Chennai, India	II. Chennai, India	Transit	V. Kathmandu, Nepal	V. Biratnagar, Nepal	Transit
August 27-2nd	Transit	IX. Ulanbataar, Mongolia	IX. Saishand, Mongolia	IX. Saishand, Mongolia	Transit		
September 17-23rd							Transit
September 24-30th	Transit	Kuala Lumpur, Malaysia	XI. Makati City, Philippines	VII. Makati City, Philippines	Angeles City, Philippines	VIII. Makati City, Philippines	Transit
October 1-7th	Jakarta, Indonesia	III. Bandung, Indonesia	IV. Sukabumi, Indonesia	Transit			

4.2 Study Objectives

1. To review and evaluate PAN's existing Health and ICT projects and make recommendations on if and how these would fit into a wider strategic regional research network (drawing from research outputs and project documentation and selected field visits to assess potential participants and discuss their current research interests);

2. To identify national needs and areas of opportunity and risk for country participation in the regional network;

3. To identify researchers from the lesser developed South Asian and Southeast Asian countries to participate in the network;

4. To identify lead Southern institutions and researchers to participate in / guide / mentor the PAN e-Health research network;

5. Drawing from the above, to make recommendations on the scope and limitations of a regional research network and propose a conceptual framework and methodology.

4.3 Study Approach

This qualitative study adapted an approach described by Hanney SR *et al*.[6] where they addressed the need for research funding bodies to demonstrate the outcomes of their research. The evaluative framework presented by Hanney *et al*. had previously been applied to assess the benefits from health services research, and had been modified to develop a benefits assessment template applicable to an NGO. Given the context of this current study, this approach was considered appropriate, and one element of the tool was adapted for application here.

To ensure a systematic approach to looking at events, collecting data, analyzing the resulting information, and reporting the results, a case study research strategy was adopted. The unit of analysis was each identified IDRC funded e-health initiative. Evidence was gathered from several sources to triangulate on issues of relevance to the IDRC assessment.

Initial contact was made with each IDRC funded e-health initiative by Kathleen Flynn-Dapaah (Senior Program Officer, Pan Asia Networking, Information and Communication Technologies for Development, at IDRC). This contact introduced the researcher, Dr. Richard E. Scott. Thereafter, the researcher pursued direct contact with each group to finalise arrangements for site visits, interviews, and collation of documents.

4.4 Study Design

Each IDRC funded e-health initiative was viewed as a single case study, presented within a country context. A cross case analysis allowed common themes, issues, and lessons to be extracted.

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[6] Hanney SR, Grant J, Wooding S, Buxton MJ. Proposed methods for reviewing the outcomes of health research: the impact of funding by the UK's 'Arthritis Research Campaign'. BMC Health Research Policy and Systems; 2004:2-4. Available at: http://www.health-policy-systems.com/content/2/1/4

4.5 Study Methods

Data collection was performed by:

1. **Documentary review (individual project reports) and literature review.**
   Key project documents, including the original grant proposals, interim reports, and end of project reports (when available) were reviewed. From these sources, and from the interviews (see below), additional core publications attributed to the research were located, as well as any subsequent literature publications (articles, posters, etc.) citing the identified papers.

2. **Semi-structured interviews with key informants**
   During site visits interviews were held with members of the research team, in particular the team leader, to determine benefits that occurred as a result of the e-health project. Additional individuals identified by the team members were interviewed (either singly or collectively) as opportunity permitted. Interviews were based on a semi-structured interview guide, informed by Hanney *et als*. framework. A summary of interview topics was sent to team leaders prior to the site visits, and then described again during the interviews. The intent was to explore the origins of the e-health project, to understand the primary outputs (such as the publications), to identify any contributions to research training and career development, and to understand whether research findings had been translated into any products, policy, or practice. Specifically, six types of potential benefit to IDRC from each project were assessed:
   a) Knowledge production - any type of publication
   b) Research targeting, capacity building, and absorption - follow-on research; training of staff
   c) e-Health solution adoption or integration - expansion or adoption of e-health solution
   d) Informing policy - policy documents; meetings with government officials
   e) Broader community, institutional, or country benefit - including social and economic benefit
   f) Health benefits to individuals or the population - more effective healthcare

3. **Bibliometric analysis**
   Bibliometric approaches have been used in the analysis of research funded by research-funding bodies. It was intended to apply this route to the current study, however, it quickly became evident during the first set of site-visits that the lack of formal publications stemming from the IDRC funded e-health initiatives precluded any useful application of this approach.

4.6 Analysis

Each IDRC funded e-health initiative was written-up as a separate narrative, organised according to a common structure, and presented within a country context. An overarching analysis across the very different contexts of the case studies drew on all of the above data sources. Common themes were identified across cases, and are summarised in the Study Results section.

5. Study Results

In addition to the site-visits for projects, three visits were made to additional informants.

1. Dr. Molly Cheah Bee Li, President, PrimaCare Network Services, Primary Care Doctors' Organisation Malaysia, Malaysia.
2. Dr. Ruben Umaly, Angeles University Foundation, Angeles City, Philippines. During this visit an introduction was made with Dr. Ricardo P. Pama, President of Angeles University Foundation.
3. Dr. Shariq Khoja, Assistant Professor, Aga Khan University, Karachi, Pakistan. During this visit discussions were also held with senior management representatives from AKU.

5.1 Review and evaluation

Each case study is briefly presented in Appendix IV. Only summary comments for each case, and the results of the cross case analysis, are presented. By analyzing within and across cases it was possible to identify the distinguishing features of more successful e-health initiatives and common areas where additional support might have been beneficial.

Each case was examined to determine their performance using the adapted tool from Hanney *et al.* (see Table 4). Performance in each category was assessed subjectively as *L*ow, *M*edium, or *H*igh based upon review of study reports, available literature, and the site visits. In addition, each case was reviewed to identify themes that highlighted *individual* strengths and weaknesses. A similar process was then conducted to identify themes (conditions / processes / facilitators / inhibitors) and key issues that highlighted similarities and differences *across* the e-health case studies.

Table 4. Summary of Study Results from Application of Adapted Tool from Hanney *et al*.

Study ID	Study Title	Knowledge production	Research targeting etc.	Adoption or integration	Informing policy	Broader benefit	Health benefits
R&D Grants							
I	ICT Enabled Life Skill and Sexuality Education for Adolescent Girls	L-M	L	L-M	L-M	M-H	L
II	Using ICT to build capacities of HIV/AIDS Service Providers in India	M	M	L	M-H	L	L
III	Development of ICT-Based Telemedicine System for Primary Community Health-Care in Indonesia	L-M	M	L	M-H	L-M	L
IV	Development of ICT-Based Mobile Telemedicine System with Multi Communication Links for Urban & Rural Areas in Indonesia	L-M	M	L	L	L	L
V	Telemedicine in Nepal: a pilot project	M	M	M	M-H	M	L
VI	Information & Communication Technologies (ICTs) Assisted Learning Tool for Deaf in Pakistan	M	L-M	L	L-M	L	L
VII	A Community-based Child Injury Surveillance System: Rapid Data Collection Using (Short Messaging Service (SMS)	L	L	L-M	L	L-M	L
VII	M-DOK: Mobile Telehealth and Information Resource System for Community Health Workers	L	L	L	L	L	L

Study ID	Study Title	Knowledge production	Research targeting etc.	Adoption or integration	Informing policy	Broader benefit	Health benefits
Projects							
IX	ICT's for Health Services in Rural Mongolia	L-M	M	L-M	M-H	L-M	L
X	ICT for Rural Development in Mountainous and Remote Areas of Northern Pakistan	L-M	M	M-H	M	L-M	L
XI	Technology-Supported Distance Non-Formal Training and education in water, sanitation and hygiene (Philippines)	M-H	M	M	L-M	M	L

It should be noted that each IDRC funded project had clearly delivered benefit in some form, although often very localized and limited in scope. The tool of Hanney *et al*. was used to bring some structure to a subjective process, and to identify benefit to IDRC as the funder – not to the funded organisations or their local environment. As such the criteria applied may not reflect what RnD grant and Project grant recipients believe to be the benefit of their individual project. For example, study VII is very much a product development and preliminary pilot activity, and in addition is not yet complete, accounting for the consistent 'Low' assessment by the identified criteria. None the less, this study has delivered local benefit, and can be anticipated to deliver more.

a) Knowledge production

This was intended to assess what, if any, publications had arisen from the study. Since all projects were required to submit proposals, plus interim and final reports to IDRC, each study received at least an 'L' assessment. Those studies that went further (submitting posters, publishing peer reviewed papers, developing functional websites, producing and distributing CD's) received a higher assessment. Of note is that at the time of the site visit, some projects were not yet complete, and this assessment may underestimate the final level of knowledge production.

b) Research targeting, capacity building

Here, follow-on research (where other projects had arisen as a result of the IDRC funded study) and capacity building through training of *staff* (formal and informal training) were identified and credited. Some studies, e.g. Study I, had effectively trained many program participants, and had also built capacity through training field workers in ICT, and therefore received a slightly higher assessment.

c) e-Health solution adoption or integration

This criterion assessed expansion or adoption of the e-health solution investigated through IDRC funding. In some cases, the e-health solution had, to some considerable degree, become 'routine' (e.g. studies II or X) or showed evidence of becoming so (e.g. studies V and IX). .

d) Informing policy

This was intended to capture the preparation of any policy documents (white papers, briefings, procedure documents) as well as evidence of meetings with government officials to facilitate knowledge transfer and evidence-based decision and policy making.

For example, study V had several standardized procedure documents available and actively utilized, but less evidence of interactions with government. In contrast, studies III and IX lacked evidence of active policy and procedure documents, but clearly displayed interaction with government as evidenced by arranging for meetings with regional (municipal) Public Health officials or the Minster of Health (respectively). Thus, although for different reasons, each was assessed Medium-High.

e) Broader community, institutional, or country benefit
The ultimate goals of any project might be considered sustainability, scalability, and transferability (i.e. capable of being applied elsewhere). Some e-health applications has, by their very nature, the ability to impact more broadly than others. This criterion was intended to capture evidence of actual (or likely) broad impact. For example, Study I clearly had a marked impact on many young adolescent women (assessed Medium-High), and Study XI lacked evidence but could be presumed to be having a broad impact though distribution of their CD's.

f) Health benefits to individuals or the population
Successful e-health solutions should positively impact individuals (patients or well citizens), local or regional communities, or the national population. Typically this is identified by having specific outcome indicators that can be objectively measured and reported. Although some funded studies may have impacted individual or population health (as evidenced by anecdote), it was considered that none had satisfactorily demonstrated evidence to this effect (through identification, measurement, and analysis of appropriate outcomes), and each was assessed as 'Low'.

5.1 Cross Case Analysis

As studies were compared with one another, a number of largely common 'themes' (common across projects) and 'issues' (relevant to at least one project or to IDRC as a funder) were identified, each of relevance to future IDRC funded e-health activities, and any planned Asian e-health research network. Each theme and issue is identified and briefly described below.

5.1.1 Themes

a) Sustainability
No project had a clear sustainability plan, thus the benefits of any single project may be short lived. In order to ensure longevity for e-health solutions, it is recommended that a 'program' mentality be fostered, such that each project includes in its preliminary proposal, and any subsequent documents, development of clear steps that will transition successful projects into sustained programs. Strategic alignment of proposed 'projects' with any community, municipal, regional, or national e-health initiatives or policy is likely to enhance the potential for sustainability.

b) Needs Assessment
Most projects had to a greater or lesser extent 'justified' their projects by identifying health related issues as the basis for seeking an e-health solution. However, if performed, 'needs assessments' were superficial in nature. If a health related need was raised as the rationale for the study, there tended to be an assumption that an e-health solution was appropriate to consider, rather than description of a logical process (supported by references) to support investigation of e-health as one *possible* approach. It was not always evident how detailed, thoughtful, critical, and formal any 'needs assessment' had been. To avoid the 'technological imperative' it is essential that a sound and objective

needs assessment be performed in order to identify the right health or healthcare issue that can be addressed by an e-health intervention.

c) Change Management

Change management was not identified by that term, however, most of the projects had identified 'change management' issues, and some had faltered due to them. For example, Project III included training which described the value of the planned e-record for identifying and planning for human resource needs to accommodate client demand (the local personnel agreed this was valuable and of benefit to them), however data entry had ceased only a few months after the software had been introduced. There is a need to build capacity in relation recognising and addressing change management issues. Future project proposals should incorporate a section that speaks to this issue to ensure it is maintained front and centre, and necessary mitigating strategies are included to address them. This issue also relates to sustainability.

d) Evaluation

Few projects attempted to design or perform any systematic evaluation. Indeed, it is fair to say that skills and understanding of evaluation to demonstrate 'value' of their interventions was poor. This offers an opportunity to raise the level of local capacity in evaluation, as well as raise the impact and likelihood of sustainability of proven solutions.

e) Dissemination

Most projects had an associated website, and some projects had produced products (e.g. CD's) that could be, or had been, distributed more broadly. Future projects should include a clear strategy for dissemination (both formal and informal) of their findings to a larger, appropriate audience.

f) Knowledge Translation and Transfer

Getting research findings into the hands of policy-makers, practitioners, universities and civil society groups in Asia is a key driving force behind PAN's mission. According to a study done by IDRC's Evaluation Unit, even the best policy research will have little or no influence in policymaking arenas if results are not made available to decision-makers (Adamo, 2002)[7]. Few projects demonstrated an understanding of the need for this type of activity, and none demonstrated a clear strategy by which to achieve it, or the requisite skills to perform it.

In addition, several general 'issues' came to light which also will need to be addressed. These included application software (open source versus proprietary), application focus (e.g. use of GIS or m-health tools), and local e-health knowledge and expertise (skill transfer and capacity building).

5.1.2 Issues

i) Application Software

IDRC has identified examination of 'open source' [8] as a value proposition with special relevance to the developing world. Several projects had developed their own software solution, sometimes with prior consideration and examination of existing software solutions. Some groups were aware of global standards (e.g. HL7), whilst others were not. The long term implications of not developing HL7 compliant software were not always appreciated. As

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[7] Adamo A. Strategic Evaluation of Policy Influence: What Evaluation Reports Tell Us About Public policy Influence by IDRC - Supported Research. Available at: http://network.idrc.ca/uploads/user-S/10359910880strategic.pdf.

[8] Dravis P. Open Source Software: Perspectives For Development. Published by InfoDev, November 2003. Available at: http://infodev.org//en/Publication.21.html

a result some of these solutions may not be transferable to other jurisdictions for broad and scalable application; their use will remain localized. Although attractive in principle, 'open source' is not without controversy and limitations, including quality of development and ongoing maintenance. Consideration should be given to whether 'open source' software solutions should be required, recommended, or optional for projects in the planned regional research network.

IDRC could also assist in development of appropriate software solutions by encouraging broader awareness and involvement of experts able to address inter-jurisdictional needs through application of standards, whilst promoting development and application of open source solutions for developing countries.

ii) Application Focus
Consideration should also be given to whether the planned regional research network should focus projects towards one or a limited number of specific areas or application (e.g. *PACER* - *P*ublic health [including surveillance], *A*dministration, *C*linical, *E*ducational, or *R*esearch), or specific technologies (e.g. the application of GIS [Geographic Information Systems] technology to the planning, design, and implementation of e-health solutions; the use of m-Health [mobile-Health technologies] such as cellular telephones / PDAs / 'smart' 'phones with advanced capabilities such as GPS, or video streaming).

iii) Local Capacity
One goal of development (and of IDRC) is to ensure strategies for systematic growth in local capacity (and gender equity) through both intra-regional and inter-regional liaison, collaboration, and consultation. It was evident from the site visits that there is a lack of requisite local researcher and institutional expertise, and human resource capacity, in regard to several important areas (see 'themes' above). The planned regional e-health research network must ensure support is included that will raise expertise in these areas, both for individuals and institutions within the network and outside of the network.

6   National Needs of Selected Countries

To be effective, activities of the planned Pan-Asian e-Health Research Network should focus on countries most 'ready' to adopt e-health solutions, on national health needs, and on areas of opportunity, and must address possible risks to participation (individual and country) in the regional network. Significant effort was expended in collating information related to the national health and e-health needs of Asian countries, seeking areas of opportunity and risk whilst doing so. The findings are presented in Appendices V and VI, and are summarised below.

6.1   National Health Needs of Select Asian Countries

Much has changed in Asia over the last 4-5 decades[9]. There has been an overall trend towards smaller families and longer life, as well as significant economic growth. In regard to national health needs the findings were not unexpected. Many Asian countries remain focused on addressing specific communicable diseases (including TB, malaria, and HIV/AIDS), and handling ongoing issues around safe water and hygiene. However, some 'emerging countries' are increasingly having to address 'Western' non-communicable diseases such as obesity, heart

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[9] Hans Rosling. Myths about the developing world. Available at:
 http://video.google.com/videoplay?docid=4237353244338529080&pr=goog-sl. Last checked - 25 June 2007.

disease, and a rising incidence of diabetes (and related long-term complications)[10]. Even alcohol and tobacco use, substance abuse, and diseases of affluence and sedentary lifestyles are becoming issues of concern.

Child survivial, as an indicator of a countries 'well being', is strongly linked to economic development, but it appears that progress is much faster if a country is 'healthy first' rather than 'wealthy first'. Coupled with the greater inequity of access to basic health services that exists in many developing countries, an appropriate and viable opportunity exists to apply e-health solutions. This is particularly so given the recent WHO Resolution encouraging member states to develop e-health strategies and implement e-health solutions. However, widening of the digital divide within countries may inadvertently lead to a development divide, removing much of the 'most needy' population from the benefits of e-health and prosperity through development.

Short summaries of regional and national programs and strategies related to e-health are provided in Appendix V. In addition, individual country health profiles are provided as basic backdrop to this report.

6.2   Evaluating the Environment – 'Readiness of Asian Countries'

Successful integration of e-health requires that complex issues be addressed, including social, political, organizational, and infrastructure issues. The 'bottom line' is that investing in e-health solutions will most likely be successful when undertaken in 'e-ready' environments. Many factors are not obviously linked with e-health (general literacy, poor health), whilst others are (poor access to technology, poor technology literacy, poor communications infrastructure), but for sustainability, the potential impact of each factor must be assessed and mitigated against.

Based on the experience of InfoDev, several specific factors can be identified that influence the outcomes and objectives an organization is able to achieve: socio-cultural and political factors, the telecommunications environment, the current information needs within a country, and the presence of language barriers. This can be equated to work done in the e-health arena that addresses 'e-Health Readiness' of individuals, organizations, and countries. e-Health readiness of Asian countries could not be assessed within the current study, as there is no recognized country level e-Health Readiness tool, and only one conceptual model[11]. Therefore, the tool developed by InfoDev was used to provide a 'high-level' and preliminary assessment of the readiness of the environment of Asian countries for application of ICT solutions in general. It was anticipated this might provide some guidance as to which, if any, Asian country might be optimally placed to consider adoption of e-health solutions, or conversely which country may not be an appropriate choice at this point in time.

InfoDev's tool (Appendix VI) uses several specific questions or criteria to allow a subjective score to be assigned for each country. Using the score, the basic approach to implementation of an ICT-based activity can be determined. In this regard, InfoDev recommended three approaches to implementation: High score (13-16) - focus on an application; Medium score (9-12) - adopt a hybrid approach; Low score (4-8) - focus on infrastructure.

Applying InfoDev's tool provides the following assessment for selected Asian countries.
  ➢ Focus on e-Health *Applications* (High Score): Hong Kong, India, Japan, Malaysia, Philippines, Singapore, Thailand.

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[10] World Health Organization. Preventing chronic diseases - a vital investment: WHO global report. WHO, Geneva, 2005.
[11] Chowdhury MFU, Scott RE. Assessing e-Health Readiness of a Country. *5th Annual Canadian Society of Telehealth Conference, Vancouver, British Columbia*; 3-5 October 2002.

- ➢ Focus on e-Health *Applications and Infrastructure* (Medium Score): Brunei Darussalam, China, Indonesia, Lao PDR, Pakistan, South Korea.
- ➢ Focus on e-Health *Infrastructure* (Low Score): Afghanistan, Bangladesh, Bhutan, Cambodia, Iran, Macao, Maldives, Mongolia, Mynamar, Nepal, North Korea, Sri Lanka, Timor-Leste, Vietnam.

7 Active e-Health researchers in selected countries

Capacity building of the network will be greatly enhanced if researchers from Asian countries are identified and invited to participate in the network. With this desire in mind, Internet searches were performed to identify such individuals in select South Asian and Southeast Asian countries. Despite these efforts, only four individuals were identified: The restriction of searches to English only sources, the lack of e-Health research in developing countries, and a lack of use of the Internet as a vehicle by some researchers to promote their work, may have contributed to this relative dearth. The individuals identified were:

- o Sanjay Prakash Sood, currently stationed for the Government of India in Mauritius, as Head, C-DAC School of Advanced Computing (University of Mauritius),
- o Dr. Chandrakant S. Pandav, a Faculty member at the Centre for Community Medicine, All India Institute of Medical Sciences (AIIMS), New Delhi, India.
- o Dr. Bir Singh, Professor in Community Medicine and Coordinator of the AIDS Education & Training Cell at AIIMS).
- o Dr. Shariq Khoja, Assistant Professor, Aga Khan University, Karachi, Pakistan.

The goal of identifying suitable individuals was also pursued with team leaders and team members during site visits, but with no success. The desirability of this goal should be re-assessed by the Project Design Team, and if still considered of importance, a new strategy devised by which to accomplish the goal.

As noted before, each of those groups recently or currently engaged in IDRC funded e-Health projects indicated their interest and willingness to participate in future initiatives. For this reason, these specific individuals are identified below.

- o Dr. Soegijardjo Soegijoko; Biomedical Engineering Program, Department of Electrical Engineering, Institut Teknologi Bandung (ITB)
- o Dr. Ayedee Ace Domingo; SynapseHealth Solutions, Inc.
- o Dr. L. Ramakrishnan**;** SAATHII (Solidarity and Action Against The HIV Infection in India)
- o Ms. K.R.Renuka; Centre for Women's Development and Research
- o Dr. Mohan Raj Pradhan; HealthNet Nepal
- o Dr. Alvin Marcelo; Medical Informatics Unit, College of Medicine, University of the Philippines
- o Dr. Angelo Juan O. Ramos; Molave Development Foundation, Inc. (MDFI)
- o Dr. Hameed Khan; Commission on Science and Technology for Sustainable Development in the South (COMSATS)
- o Dr. Amarsaikhan; National Medical University of Mongolia
- o Prof. Dr. Soegijardjo Soegijoko; Institut Teknologi Bandung (ITB)
- o Mr. Sabahat Saeed Khan; Sustainable Development Networking Programme, Pakistan

8 Potential lead institutions and researchers

Using Internet searches, principal research institutions in select Asian countries were identified. Little information was available linking institutions to e-health research. Those institutions listed below have health studies as an area of priority and thus could contribute to the PAN Asian e-Health Research Network. A variety of organisational types are included, such as NGO's, government agencies, independent and national universities, and private enterprise. Some of the potential institutions are listed in Table 5. Additional detail is provided in Appendix VII.

Table 5. Potential Lead Institutions and Researchers in Select Asian Countries	
Country	*Institutions*
Afghanistan	Afghanistan Research and Evaluation Unit (AREU)
	Loma Linda Medical Research Center at Kabul University
Bangladesh	Bangladesh Institute of Development Studies (BIDS) – also called Bangladesh Unnayan Gobeshona Protishthan
	Bangladesh Research And Development Association (BRADA)
	Bangladesh Rural Advancement Committee (BRAC), Research and Evaluation Division (RED)
	ICDDR,B: Centre for Health and Population Research (formerly known as the International Centre for Diarrhoeal Disease Research, Bangladesh)
	Bangladesh Medical And Research Council (BMRC)
Bhutan	Centre for Bhutan Studies
	Department of Information Technology
	Center for Educational Research and Development (CERD)
Cambodia	National Institute of Public Health (NIPH)
	Center for Advanced Study (CAS)
	Institute of Research and Advanced Studies (IRAS)
India	Indian Council of Medical Research (ICMR)
	One World South Asia (OWSA)
	M. S. Swaminathan Research Foundation (MSSRF)
	Indira Gandhi Institute of Development Research (IGIDR)
	National Institute of Science, Technology and Development Studies
	Indian Association of e-Health Care
	Indian Space Research Organization (ISRO)
	SAATHII (Solidarity and Action Against The HIV Infection in India) *
	Centre for Women's Development and Research *
Indonesia	Airlangga University
	Padjadjaran University
	National Institute of Health Research and Development (NIHRD)
	SynapseHealth Solutions, Inc. *
	Institut Teknologi Bandung (ITB) - Research Group on Biomedical Engineering Biomedical Engineering Program *
Malaysia	Institute for Medical Research (IMR)
	Malaysian Health Informatics Association (MHIA)
	Malaysian Institute of Microelectronic System (MIMOS)
Mongolia	*National Medical University of Mongolia **
Nepal	Environment and Public Health Organization (ENPHO)

Table 5. Potential Lead Institutions and Researchers in Select Asian Countries	
Country	*Institutions*
	Royal Nepal Academy of Science and Technology (RONAST)
	HealthNet Nepal *
	Research and Education Network Nepal (RENN)
	International Centre for Integrated Mountain Development (ICIMOD)
Pakistan	Pakistan Medical Research Council (PMRC)
	Preston Institute of Management, Science and Technology (PIMSAT)
	Aga Khan University (AKU)
	Agha Khan Rural Support Programme (AKRSP) *
	eHealth Services Private Limited
	Pakistan Education and Research Network (PERN)
	Khyber Medical College
	COMSATS Institute of Information Technology (CIIT) [COMSATS = Commission on Science and Technology for Sustainable Development in the South] *
	Baltistan Health and Education Fund (BHEF) *
	Karakoram Area Development Organization (KADO) *
	Sustainable Development Networking Programme *
Philippines	Centre for Research and Communication (CRC)
	Isis International
	Department of Science and Technology (DOST)
	Philippine Council for Health Research and Development (PCHRD)
	Multipurpose Community Telecenters (MCT)
	Molave Development Foundation, Inc. (MDFI) *
	University of Philippines
Singapore	Yong Loo Lin School of Medicine
	Agency for Science, Technology and Research (A*STAR)
	Singapore Advanced Research and Education Network (SingAREN)
	Nanyang Technological University (NTU)
	National Medical Research Council (NMRC)
Sri Lanka	National Science Foundation (NSF)
	Arthur C Clarke Centre for Modern Technologies (ACCIMT)
	Mecat Medical Research Institute Sri Lanka
Thailand	Institute of Health Research
	ASEAN Institute for Health Development (AIHD)
	Thai Health Promotion Foundation (ThaiHealth)
Vietnam	Information Technology Institute (ITI)
	Vietnamese Academy of Science and Technology
	Ministry of Science and Technology
	Hanoi Medical University
* Currently or recently active with an IDRC e-health related project.	

9 Pan Asian e-Health Research Network

9.1 Network Name:

It is proposed that the planned PAN Asian e-Health Research Network might best function as a collaborative [12] that promotes evidence-based adoption and application of e-health solutions within the Asian context. With this in mind, and in alignment with similar IDRC network acronyms, this new network might be identified as "PANACeA" – the _PAN A_sian _C_ollaborative for _e_vidence-based _e_-health _A_doption and _A_pplication.

Whilst e-health is certainly not considered a 'panacea' in the literal sense, there is an understanding (even expectation) globally that e-health will be an important tool that can be used to address many pressing health and healthcare issues in all countries. Further, the title aligns with previous IDRC network acronyms, and it is memorable. In addition, the inclusion of the need for a solid evidence-base implies that only proven 'technologically appropriate' [13] e-health solutions are promoted. Finally, inclusion of the terms adoption and application implies only sustainable solutions will be promoted.

9.2 PANACeA Conceptual Framework

Building on perspectives and information provided earlier in this report, established principles of e-health program development and evaluation, and proven approaches by IDRC for development and network initiatives (regional networks that combine research, capacity building, knowledge sharing, and administrative resilience), the following is proposed for consideration [14].

The network approach for PANACeA should adopt a conceptual model that is outcomes focused and 'e-health initiative centric', adopts and applies established approaches to e-health program development and evaluation, and facilitates international and inter-institutional collaboration. It will be structured as an inclusive and efficient North–South–South network, and to ensure it is shaped by regional specificity and context, PANACeA will be led by a Southern partner.

Figure I illustrates the proposed conceptual framework. At the centre of the Network's activities will be the applied research *e-health initiatives* funded by IDRC. To ensure evidence is gathered about the value of each e-health initiative, *established methodologies* or principles (for needs assessment, outcome selection, evaluation, etc.) and outcome indicators will be applied. These methodologies will be applied by *institutions and researchers* from two or more *countries* (acting either as research partners or mentors) in performing comparative or conjoint e-health studies. Overseeing the performance of the network and each funded e-health activity will be an *Advisory and Monitoring Team*; their role will be to facilitate the functioning of the network, monitor progress of network activity and individual initiatives; offer guidance to individual initiatives; sponsor or support e-learning and communication activities.

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[12] Collaborative: Characterized or accomplished by collaboration. Collaboration: To work together, especially in a joint intellectual effort.

[13] 'Appropriate technology' is technology that is most appropriate to the environment and culture it is intended to support. It is suitable for use in developing nations or underdeveloped rural areas of industrialized nations, which may lack the money and specialised expertise to operate and maintain high technology. In practice, it is often something that might be described as using the simplest and most benign level of technology that can effectively achieve the intended purpose in a particular location. (Taken from Wikipedia).

[14] Several fundamental decisions must be made by the Project Design Team (e.g. around themes and issues [Section 5.1] and Scope and limitations [Section 9.3]); as a result, only a high-level conceptual framework is offered.
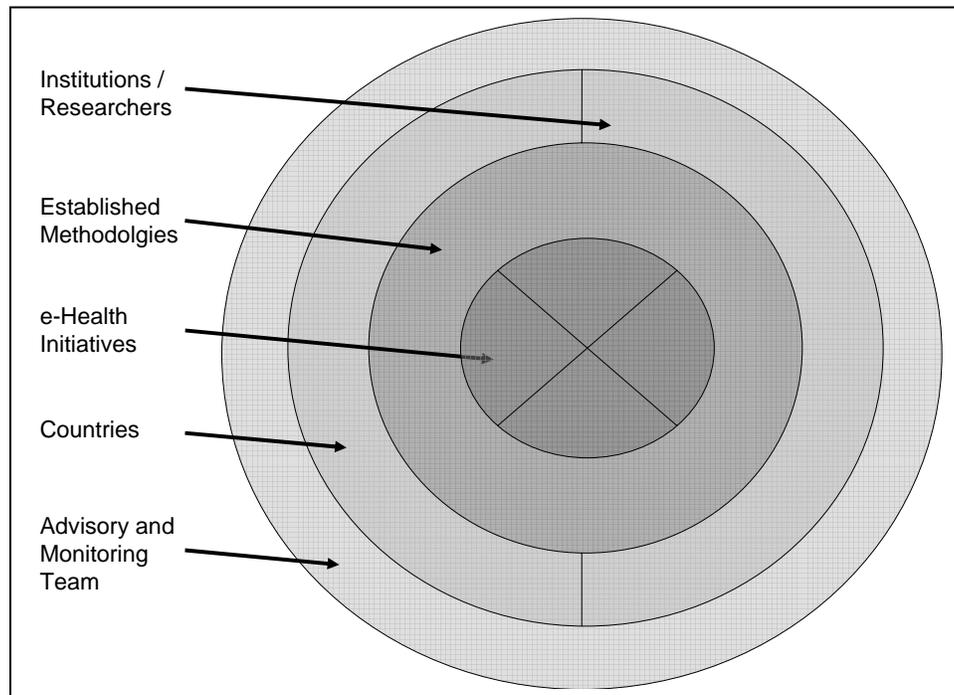
Figure I. Conceptual Framework for PANACeA

Field observation and application of the InfoDev tool indicate heterogeneity between Asian countries in terms of their e-health readiness. To address this, two strategies are recommended. Adopting a 'mentor' approach provided by more advanced countries and experienced institutions and researchers, and encouraging less e-health ready countries to participate as collaborators (active) or observers (passive) in PANACeA. These may create future opportunities for 'South–South' interaction, as less developed countries learn from the success of their counterparts. Incorporating this strategy into PANACeA may also lessen widening of the digital divide as some Asian countries progress more rapidly than others.

9.3   Scope and Limitations:

Considerations for the Project Design Team

Just as IDRC must make choices concerning which Programs to support, so too must individual programs make choices about what projects they will support. e-Health can generally be considered to have application in several areas as described using various acronyms [15]. Even within one of these areas, multiple sub-areas can be described (e.g. within 'education' might be education of the populace or education of healthcare providers; or within 'clinical' a host of individual diseases or specialties might each benefit from an e-health application – teledermatology, telediabetes care). Will PANACeA restrict focus to one (or more) of these? Doing so might well allow much more rapid and solid progress to be made in the selected area of focus. On the other hand, doing so might be argued to counter an identified characteristic of IDRC – to take its lead from foreign researchers. It might also decrease the ability of groups to

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[15]   **CARES** *(C*linical, *A*dministrative, *R*esearch, *E*ducational, and *S*urveillance) is common. This acronym was subsequently revised by the PDT to - PACER (*P*ublic Health, *A*dministrative, *C*linical, *E*ducational, and *R*esearch). Each PANACeA project will be required to describe how the project addresses one or more of PACER. .

address the findings of their own needs assessment (identifying those applications that address the most pressing local, regional, or national health need for which e-health may offer a solution).

It is recommended that decisions around the issues described below (some identified earlier), should be addressed and resolved early by the Project Design Team:

1. Funding approach. Will PANACeA function in a similar manner to past IDRC 'ICT in health' funding opportunities, i.e. with several modest R&D grants and fewer larger Project grants? Or, will PANACeA simply offer similar funding levels to a more restricted number of projects? Will just a single funding opportunity exist, or will two funding opportunities be offered?

2. Country Participation. The environmental assessment showed a range of 'readiness' of Asian countries to pursue e-health initiatives. Should there be a focus on particular countries?
   a) If so;
      i) Should investment be made in those countries identified as 'low' (Section 6.2) in their readiness so that they do not fall still further behind as progress is made in other countries? Or,
      ii) Should investment be made in those countries identified as 'high' (Section 6.2) in their e-readiness so that a small number of countries are optimised in terms of their use of e-health, and can be viewed as regional models? Or,
      iii) Should investment be made in those countries identified as 'medium' (Section 6.2) in an effort to quickly grow the proportion of Asian countries successfully applying e-health?
   b) If not, how will participation in PANACeA be determined and maximised?
   c) IDRC's PAN has identified several countries as priorities for involvement in PAN activities (Cambodia, Mongolia, Bhutan, Indonesia, and Sri Lanka). Should focus within PANACeA be given to these countries?

3. Application Focus.
   A stated desire of IDRC is to move towards examination of 'm-health' (mobile-health) solutions (i.e. use of mobile technologies and communication tools such as PDA's, Smart Phones, even tablets and i-Pods). In addition, there is recognition of how underutilised GIS tools are within the health sector, particularly when aligned with e-health applications. Should a requirement for funding be the need for inclusion of one or both of these elements?

4. Project Focus.
Should projects supported through PANACeA focus on solving technology issues (which is the most 'appropriate technology'), infrastructure issues (how should data or information be transmitted), or content issues (what should be communicated and in what language)? Should projects focus on Health Informatics solutions (e-health or e-medical records), specific Health Informatics solutions (disease prevalence or demographic surveillance applications)[16], or Telehealth solutions (telelearning for patients or providers, teleconsultation between providers)?

IDRC itself has posed very relevant questions:
   ➢ Which ICT health applications have had the most beneficial outcomes on people's health and health systems?
   ➢ 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?
   ➢ What is the potential of using new pervasive technologies (such as mobile phones) as tools to make the delivery of health services or information more effective?

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[16]   CHSRF. Electronic decision support tools bring better care to the bedside. In 'Evidence Boost', December 2005. Available at http://www.chsrf.ca/mythbusters/pdf/boost4_e.pdf (last accessed 14 November 2006).

> ➢ What types of applications are best suited to help prepare for, or mitigate the effects of, pandemics such as SARS and the Avian Flu?
> ➢ Which e-health solutions are best suited to make positive impacts on rural health (mobile phones, radio, community access centres)?

These remain largely unanswered. Should PANACeA simply focus attention on answering such fundamental questions?

5. *Involvement of past projects.*

One goal of the study was to review and evaluate PAN's existing e-health initiatives and to make recommendations on if and how these would fit into a wider strategic regional research network.

a) Should recent or current e-health projects automatically be earmarked for funding through PANACeA?

b) Some of the recent or current initiatives could benefit from additional funding for one or more purposes: e.g. change management, dissemination, expansion, sustainability. Could a distinct, modest funding opportunity be made available to support sustainability or scaling of past studies?

6. *Needs Assessment.*

Given the dynamic nature of e-health this is very appropriate – we are trying to gather evidence 'on the run', often designing, piloting, and implementing as we go. There is a danger to this approach – the 'technological imperative'. e-Health is increasingly applied because 'it works' (we *can* connect people through technology to interact remotely), and because 'it feels right' (connecting people must surely facilitate better care, education, and efficiency and effectiveness of healthcare). Therefore e-health has to be the answer! This is a dangerous presumption and strategy for developed countries, but even more so for developing countries with limited financial resources, pre-existing desperate health issues, and a growing 'digital divide'.

Successful adoption and integration of e-health requires that complex issues be addressed, including social, political, organizational, and infrastructure issues. The 'bottom line' is that investing in e-health solutions will most likely be successful when undertaken to satisfy health needs broadly recognised as important.

7. *Network Communication.*

Internet capability for e-mail and information access is fundamental, and forms the backbone for a functional 'network', allowing exchange of information, sharing of experiences, and research collaboration. InfoDev's experience [17] suggests that these basic capabilities can be enhanced (e.g. on-line discussions, chat rooms) and result in positive impact. On the one hand this encourages development of an 'e' culture, but on the other hand the likelihood of actual use (in the absence of such a culture) is slim. At this time such 'frills' are unlikely to add significant benefit to PANACeA, but should be capable of addition if experience indicates readiness to adopt and apply. Given these thoughts, how might PANACeA best communicate internally?

8. *Capacity Building.*

This has become something of a trite phrase. However its importance remains. ***e-Health has, is, or will, impact every dimension of health and healthcare***. Given this, it is imperative that developing countries not simply follow the lead of developed countries, or even internalize the 'lessons learned' from those sources (which may not be appropriate in a developing country context). Instead local and regional debate and investigation is highly desirable. PANACeA can facilitate debate and development of domestic and regional research capacities in Asia, including training of young researchers.

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[17]   UNAIDS/WorldBank. Increasing electronic connectivity between strategic allies in the HIV/AIDS field in South East Asia – Final Project Report

Capacity building could be provided within PANACeA during its annual meetings through providing structured 'intensive workshops' that address issues of broad relevance to all participants (e.g. addresses the themes and issues identified above). Training could also be provided in other ways, including a PANACeA sponsored distance education program (Certificate in e-Health), or exchange visits or structured programs with the Global e-Health Research and Training (GeHRT) program. Formal degree oriented training could be achieved through PANACeA by funding places on the University of Victoria 'Distributed Master's Program in Health Informatics', or by funding emulation of this concept within Asia.

9.4   Methodologies, Approaches, and Tools

9.4.1   Evaluation Framework for PANACeA - Perspective

In terms of ICT application, IDRC activities are characterized by support for *applied research*.

The evidence-base for e-health remains very poor – we continue to implement on faith. To this point, evaluation of e-health initiatives, particularly smaller local initiatives, has been poor globally, and the literature is replete with papers identifying this, and providing recommendations and guidance on the need and ways to improve evaluation.

Within the frame of applied research then, sound evaluation of e-health is imperative. But, no prior expectations have been provided by IDRC to their funded study groups for demonstration of value for either IDRC or for the specific e-health initiatives. This should be corrected during the design and implementation of PANACeA.

Arguably, there are two primary foci for an e-health evaluation. First, for the benefit of the organization providing the financial resources (funding agency) which wants to know that their investment has been of 'value'. Second, for the organization performing the study (study agency) which wants to know their e-health application has been of 'value'. This simple scenario is often muddied when more than one funding agency (with different expectations) is involved with any single initiative. Similarly, the complexity increases as the number of 'stakeholders' involved with a local study rises. For illustrative purposes, the simple single agency - limited stakeholder model will be retained.

9.4.2   Funding Agency – e-Health Evaluation Framework

In regard to the funding agency, a distinct approach is required. The framework adopted for the study reported here was based on the work of Hanney *et al*. It did not prove wholly satisfactory, but a significant part of this shortfall was due to a lack of describing expected measures to the funded groups prior to onset of projects. Had specific, measurable, and achievable outcomes been defined, then each group would have strived to demonstrate them.

It is recommended that the base framework used in this report be critiqued and modified by the Project Design Team or Advisory and Monitoring Team. A small set of reasonable metrics should be identified that would then be applied to all future e-health initiatives funded by IDRC.

For example, IDRC recognises the importance of several fundamental characteristics related to the concept of effective programming [18]. Two of these refer to "more 'complete' projects"; and these characteristics, listed below, may offer an alternative - or additional - yardstick by which to examine and assess future IDRC funded e-health projects.

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[18]   IDRC Strategic Plan 2005-2010.

- More "complete" projects pay as much attention to the front end (project design, adequate budgets) and back end (dissemination, communication, networking) as they do to the middle (monitoring the progress of the project);
- More "complete" projects build in support for (seemingly) "non-core" activities, such as institutional support, travel to professional meetings, and access to data and information.

9.4.3   Study Agency – e-Health Evaluation Framework

In regard to the study agency, some guidance can be given regarding sensible approaches to evaluation, based upon literature evidence and experience gleaned in Canada.

A model? Many 'models' for *telehealth evaluation* have been documented in the literature. Of these, several are known to be used within Canada – the IOM (Institute of Medicine) model, the Balanced Score Card model, the Donabedian (Structure, Process, Outcome) model, the modified Donabedian model, the CHIPP (Canadian Health Infostructure Partnerships Program) model, and the Hicks and Boles model [19]. However, a meeting of Canadian experts concluded recently that one model could not be recommended over others; indeed, it is less important which model is used, rather it is simply important that some model be used in order to provide structure to an evaluation.

Outcome indicators! The goal of any e-health intervention should be to have a distinct, measurable, and meaningful impact on the health (wellness) or healthcare of individual patients, or their communities. Documenting this is the process of evaluation, and measuring this requires specific outcome indicators which must be chosen carefully.

A recent study [20] identified that a wide range of parameters have been measured in telehealth evaluations. These parameters have been viewed as 'outcome indicators', although in reality most have simply been 'process indicators'. This is a constant danger; 'process indicators' are more easily identified and more easily measured, but they do not provide evidence of the true outcome of e-health interventions. The same study also described and emphasised the importance and value of identifying common outcome indicators that can be used within any given evaluation model and applied in all evaluations. Doing so increases the rate of accumulation and the quality of the evidence gathered to support or refute the value of e-health interventions. However, another danger is expansion of the number of indicators to be measured within a study as the requests from multiple stakeholders conflict; here the principle espoused by Albert Einstein is important: "Not everything that counts can be counted and not everything that can be counted, counts". Compromise is essential.

Skill set and experience. Another recent study identified that in many instances of telehealth (and e-health) evaluation in Canada, those expected to perform the evaluation are often unskilled, or lack experience, in performance of research or evaluation. This highlights another area of concern, which is not considered unique to Canada, and requires consideration in future evaluation strategies.

9.4.4   Pragmatic Evaluation

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[19]   Hicks LL and Boles KE. A Comprehensive Model for Evaluating Telemedicine. In: e-Health: Current Status and Future Trends. IOS Press, 2004.

[20]   Scott RE, McCarthy GF, Jennett PA, Perverseff T**,** Palacios M, Rush B. *National Telehealth Outcome Indicators Project* [*NTOIP*] - Project Information Document and a Synthesis of Telehealth Outcomes Literature. Health Telematics Unit, University of Calgary. March 2003. (Accepted for publication during 2007 as a supplement to the Journal of Telemedicine and Telecare).

With the above in mind, a recently developed conceptual approach is that of 'pragmatic evaluation'. Developed between 2004 and 2005 by the author of this report, the approach respects the need for rigour without the need for sophisticated academic research. The concept is described in IX.

Summary of Recommendations

As envisioned, PANACeA will focus on development through adoption and application of e-health solutions demonstrated to be of value through sound evaluation. PANACeA will create a favourable environment and opportunities for individual researchers in the South, allowing them to support credible e-health research, positively influence sustainable and equitable development, and inform e-health related policy debate and decision-making at all levels. This will be achieved through PANACeA's alignment with IDRC's identified goals: to strengthen and help mobilize local research capacity (capacity building); to foster and support the production, dissemination, and application of research results (knowledge transfer); and to create, reinforce, fund, and participate in partnerships between Canadian institutions and institutions in the developing world (networking).

The following recommendations are offered:

Principles:
1. The proposed PAN e-Health Research Network should be identified as "***PANACeA***" – the ***PAN A****sian **C**ollaborative for **e**vidence-based **e**-health **A**doption and **A**pplication*. As this name implies, the mandate of the Network would be to perform collaborative research that promotes evidence-based adoption and application of technologically appropriate e-health solutions within the Asian context.

2. PANACeA should ***adopt the focus and priorities of IDRC***, including addressing equity and gender issues.

3. PANACeA should ***adopt the principle of 'appropriate technology'*** as a fundamental tenet. Within this mindset, use of locally available technical and communications solutions should be prioritised. However, given the rapid advances in ICT, introduction of applications that require or utilize ***modestly advanced or open source ICT*** (e.g. m-health; GPS; GIS) should be supported.

Program:
4. The Project Design Team, or the subsequent Advisory and Monitoring Team, should critique and modify the ***Funding Agency evaluation model*** adopted for this study to generate a small set of reasonable metrics that would be applied to demonstrate 'value' of the program to IDRC.

5. PANACeA should establish mechanisms, and actively facilitate, opportunities, for ***interactive communication, exchange, cooperation, and collaboration*** between and amongst network partners. Mechanisms would include annual PANACeA meetings and web-based communication, and facilitation would include identified moderators for discussion boards. Consideration might be given to adoption of simple web-based technology (e.g. Elluminate) to establish an e-learning environment.

6. PANACeA's e-health initiatives should be preceded by a clear and comprehensive ***needs assessment*** stage to confirm that a proposed study is congruent with local, regional, or national health or wellness needs and any established or planned local, regional, or national e-health strategy. This would serve as both a reality check, an opportunity to re-align PANACeA projects, and as a practical capacity building exercise. This will also

ensure local health needs have priority, not the technology, and will enhance the likelihood of sustainability through alignment with identified priorities.

    a. Consideration should be given to establishing a distinct funding mechanism to permit needs assessment prior to full funding of an initiative.

    b. A recommended or devised needs assessment framework should be made available to Network members.

7. PANACeA's e-health initiatives should demonstrate identification of, and engagement with, all necessary stakeholders, and should include ***Knowledge Translation / Transfer and information dissemination strategies***.

8. PANACeA's e-health initiatives should ***plan for sustainability*** of those solutions whose evidence-base demonstrates utility and viability, and conversely should have the courage to disengage from those solutions for which the evidence is weak or poor. To support sustainability, e-health initiatives should:

    a. Be planned as 'programs', not as 'projects'.

    b. Identify ***change management*** issues that may arise, and plan and budget for appropriate mitigation strategies.

9. PANACeA's e-health initiatives should incorporate a clear and rigorous '***evaluation***' plan at the proposal stage. The evaluation plan must be able to provide the evidence base needed to demonstrate 'value' of the e-health initiative. Within this plan, a small number of appropriate outcome indicators must be proposed. The outcome indicators must be selected to address the study research questions, and to demonstrate value to IDRC as a funder.

    i. Consideration should be given to establishing a minimum set of outcome indicators to be applied by all network participants.

    ii. Consideration should be given to supporting educational programs (exchanges, intensive workshops) that build local capacity in the identification and description of outcome indicators, and their associated measures and tools.

10. To facilitate the above, the PANACeA program should incorporate capacity building elements that will provide guidance or instruction to address the 'themes' (Section 5.1) and 'issues' (Section 5.2) summarized above. These capacity building activities should be specifically budgeted for, and complement and enhance any local e-health capability.

Conclusion

IDRC has significant experience in the design and application of Regional Thematic Networks, Building on this prior experience and success is an appropriate direction for IDRC to pursue. In this case the region will be Asia, and the theme will be 'e-Health'. Developing the **PAN A**sian **C**ollaborative for **e**vidence-based **e**-health **A**doption and **A**pplication (**PANACeA**) will bring focus, stability, and cohesive direction, development, and assessment to IDRC's e-health activities in Asia. To maximise impact, PANACeA must include a variety of support mechanisms in defined areas (e.g. needs assessment, evaluation, outcomes, knowledge translation and transfer) to develop local skill and solutions, and the desired sound evidence base. As a result, findings from PANACeA e-health initiatives will – in an evidence-based manner - inform and influence options, directions, and consequences associated with e-health development, policy, strategy, and application in Asia.

In order to fulfill its planned engagement in the application of ICTs to the health sector, funding by IDRC of an e-Health focused Regional Thematic Network – PANACeA – is recommended.

Appendices

Appendix I – Biographies of Authors

Dr. Richard E. Scott

Dr. Richard E. Scott is an Associate Professor in the Global e-Health Research and Training Program of the Centre for Innovation in Health Technology, University of Calgary. He is also a Canadian Harkness Associate (2004-2005), and a Fulbright New Century Scholar (2001-2002) alumnus; experiences that opened his policy and global perspectives, respectively. He now focuses his interests on examining the role of e-health (telehealth + health informatics) in the globalisation of healthcare, including aspects impacting the implementation and integration of e-health globally and locally ('glocal' e-health).

Richard views e-health broadly, as the use of any information and communications technology (ICT) to mediate health, healthcare, health education, or health research. He has over 30 years of research and healthcare experience as a medical laboratory technologist, biochemist, clinical chemist, clinical and forensic toxicologist, Director of Research, and telehealth / e-health researcher.

His research program is directed towards inter-jurisdictional e-health policy (management and facilitation of the complex trans-border interactive environment of 'glocal' e-health), outcomes and evaluation (identifying and defining suitable outcome indicators and developing tools and frameworks for rigorous demonstration of the value of e-health through 'pragmatic evaluation'), and environmental e-health (a new area of research spawned by Richard to understand the environmental costs and benefits of e-health). Richard promotes the application of 'culturally sensitive and technologically appropriate' e-health solutions in the international context, and is pursuing and promoting collaborative research in Asian, African, and Latin American and Caribbean countries.

Dr. Ayida Saeed

Ayida Saeed is a Research Assistant at the Centre for Innovation in Health Technology (CIHT), Faculty of Medicine, University of Calgary. A dentist by profession with more than 8 yrs of healthcare experience with reputed clinics/hospitals in South Asia and the Middle East, Ayida joined the research team at the Centre in 2006, under the supervision of Dr. Richard Scott.

In addition to her clinical acumen, Ayida's superior organizational skills have called for her active participation in community camps and dental awareness programs conducted by various professional organizations. Ayida holds membership of the Indian Dental Association, and has presented dental seminars in the past, relevant to specialties such as Oral and Maxillofacial Surgery and Orthodontics.

As a Research Assistant at the CIHT, Ayida has been working with Dr. Scott on several recent projects, including the PAN Regional Health and ICT Research Network (IDRC) and BCATPR-Telehealth Policy Baseline Study (MSFHR). The research support position has furthered her knowledge of e-health for development, as well as implementation and knowledge transfer of health outcomes research.

Appendix II - Terminology

What is 'e-Health'?

e-Health is now an accepted umbrella term used for any form (or mode of delivery) of information and communications technology (ICT) used to improve health (i.e. wellness) or to facilitate health*care*.

To 'define' something is to set rigid limits to it. There are over 51 'definitions' of e-health available in the literature, with no sign of consensus, which is not at all helpful. The root cause is simple; it remains difficult to 'define' the field of e-health since it is actively growing and maturing almost on a daily basis. Therefore, instead of defining it, a much better approach is to 'describe' it. In this regard two recent descriptions are helpful, the first from the European Commission and the second from the WHO:

> "e-Health tools or solutions include products, systems and services that go beyond simply Internet-based applications. They include tools for (both) health authorities and professionals as well as personalised health systems for patients and citizens. Examples include health information networks, electronic health records, telemedicine (telehealth) services, personal wearable and portable communicable systems, health portals, and many other information and communication technology-based tools assisting prevention, diagnosis, treatment, health monitoring, and lifestyle management." [21]

> "e-Health is the cost-effective and secure use of information and communications technologies in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research."

Together these descriptions capture the overall depth and breadth of what e-health is now, and what we expect it to be in the near future, and underscore the need to look at 'e-health' solutions in a collective and expansive sense.

Components of e-Health and Their Interrelationship

Consider a simple video-consultation between a patient in Phuket, Thailand, and a mental health counselor in Calgary, Alberta. The interactive component of the video-consultation itself is providing health*care* at a distance; this is typically recognized as *telehealth*. In contrast, the information to which the specialist may refer is contained in the patient's electronic health record (EHR); this is typically recognized as *health informatics*.

What is Health Informatics?
The area of Medical Informatics has been well defined. For example, the AcademyHealth Glossary of Terms [22] defines Medical Informatics as:

> "The systematic study, or science, of the identification, collection, storage, communication, retrieval, and analysis of data about medical care services that can be used to improve decisions made by physicians and managers of health care organizations."

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[21] European Commission Action Plan (April 2004)
[22] Glossary of Terms Commonly Used in Health Care. 2004 Edition. AcademyHealth, Washington, DC.

The term 'Health Informatics' is tending to replace the previous term 'Medical Informatics'" [23]. This evolution has occurred for much the same reason that 'Telemedicine' is steadily being replaced by 'Telehealth'. Healthcare - and increasingly wellness - is about much more than simply the medical model and physicians.

Being somewhat newer, defining 'Health Informatics' is still somewhat fluid, although the above definition for Medical Informatics has been adapted. As an alternative, COACH (Canada's health informatics association) has defined Health Informatics as:

> "The application and adoption of information management and technology to the business of healthcare with the goal of improving health outcomes." [24]

A common theme, then, is the handling of data or information to facilitate health related decisions and outcomes.

What is Telehealth?

Similar to e-Health and Health / Medical Informatics, a host of definitions exist for Telehealth. However, perhaps the most relevant remains that from Reid from 1996 [25], although with three small adjustments. Reid's definition was originally for telemedicine, but can be simply transposed to be equally applicable to telehealth.

> Original definition: "Telemedicine is the use of advanced telecommunication technologies to exchange health information and provide health care services across geographic, time, social and cultural barriers."

> Adapted definition: "Telehealth is the use of information and communication technologies (ICT) to exchange health information and provide health care services across geographic, time, social, cultural, and political barriers."

Why the adaptations? Three were made. First 'advanced' was removed, because we now appreciate that any ICT (from the telegraph to the Internet) can be used – it need not be (often should not be) just advanced technology. Second 'telecommunications' was replaced by 'information and communications' to be current – most reference today is made to ICT's (information and communication technologies) not just TC's. Third, an additional barrier – political – was inserted to again reflect reality (it should be noted that Reid's definition was perhaps the first to explicitly identify the ability of telehealth (telemedicine) to transcend 'barriers'.

Overall, Telehealth can be considered the component of e-Health that facilitates interaction, direct (as in video or audio teleconsultations, and SMS reminders), or indirect (as with patient portals or home monitoring). It is this interactive component with a patient wishing to get better or a 'citizen' wishing to stay well, that differentiates Telehealth from Health Informatics (the data or information component).

A common theme for telehealth, then, is the interaction (direct or indirect) with 'someone' for a health or wellness related purpose over distance and across barriers.

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[23] UK Health Informatics Today. The Newsletter of the UK Health Informatics Society. No. 49 Spring 2006.
[24] Sovereign Information Systems Inc. COACH Strategic Plan for the period April 2005 to April 2008. Final version – updated 1 November 2004.
[25] Reid, J. (1996) A Telemedicine Primer: Understanding the Issues. Billings, Montana: Artcraft Printers.
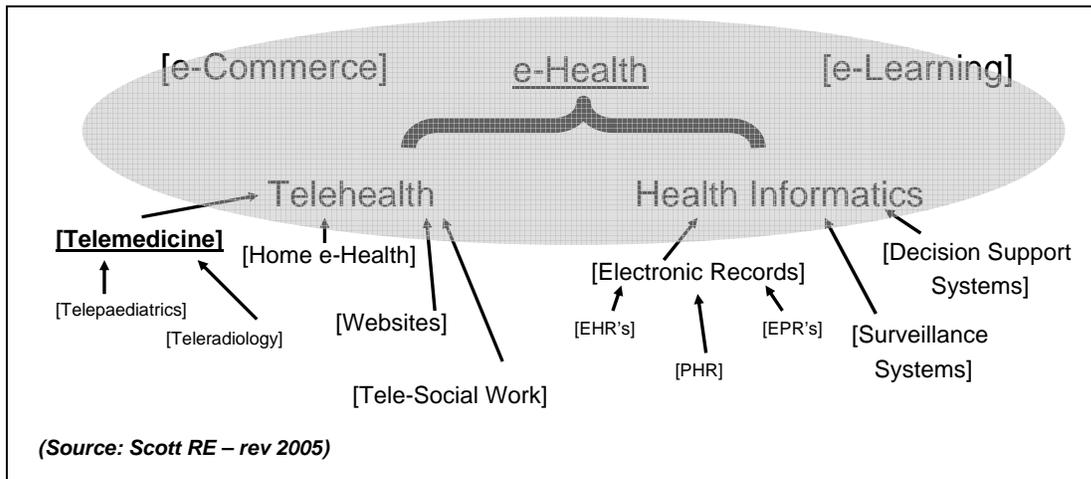
Where do all the pieces Fit?

Figure 2. Hierarchical structure showing examples of e-Health applications and components

To summarise in simplistic terms, Health Informatics can be considered the data element, whilst Telehealth can be considered the interactive element. Together they constitute e-Health, and their relationship and impact is synergistic.

The above diagram (Figure 2) endeavors to provide more detail and provide some hierarchy to assist understanding. However, it is simply an aid to conceptualise this complex area - _note the grey ovoid_. This is intended to be indicative of the fact that there is great overlap in many e-health applications. For example, increasingly there will be both a Health Informatics component and a Telehealth component to many applications. Also, there will often be an e-commerce or e-learning component within an e-health initiative. e-Health is, of necessity, a multidisciplinary entity.
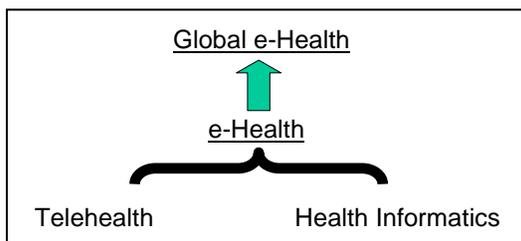
Global e-Health.

Figure.3. Relationship of e-Health components to Global e-Health

Ultimately, the culmination of all that we do as individual e-health programs or country initiatives is creation of the entity of Global e-Health (Figure 3). This entity of Global e-Health has also been defined [26]:

"The sustainable global integration of ICT into the practice of protecting and promoting health across geo-political, socio-economic, cultural, and temporal barriers - including research and education - to facilitate health, public and community health, health systems development, and epidemiology."

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[26] Scott RE, Palacios MF. e-Health - Challenges of Going Global. In: _Collaboration in Context_, Scott CM, Thurston WE (Eds). Institute for Gender Research & Health Promotion Research Group, University of Calgary. 2003.

Areas of Application

"e-Health *CARES*" is a simple acronym to remember general areas of application: *C*linical, *A*dministration, *R*esearch, *E*ducation, and *S*urveillance. Most applications can be assigned to one of these categories[27].

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[27] This was subsequently adapted by the PANACeA Project Design Team to become *PACER* – *P*ublic Health (including surveillance), *A*dministration, *C*linical, *E*ducation, and *R*esearch.

Appendix III – Classification of Asian Geographic Regions

For consistency the UN Classification system has been adopted (Table 6). For the purposes of this study, focus was given to IDRC e-Health Projects and R&D grants in Southern, South-Eastern, and Eastern regions of Asia. Specifically, site visits were made to IDRC e-Health initiatives located in Pakistan, India, Nepal, Mongolia, Philippines, and Indonesia.

Table 6. Asian Countries by Region according to the UN Classification System

Central Asia	
Kazakhstan	Turkmenistan
Kyrgyzstan	Uzbekistan
Tajikistan	
Eastern Asia	
China	Japan
Hong Kong *	Mongolia
Macao *	Republic of Korea
Democratic People's Republic of Korea	
* Special Administrative Region of China	
Southern Asia	
Afghanistan	Maldives
Bangladesh	Nepal
Bhutan	Pakistan
India	Sri Lanka
Iran, Islamic Republic of	
South-Eastern Asia	
Brunei Darussalam	Philippines
Cambodia	Singapore
Indonesia	Thailand
Lao People's Democratic Republic	Timor-Leste
Malaysia	Viet Nam
Myanmar	
Western Asia	
Armenia	Lebanon
Azerbaijan	Occupied Palestinian Territory
Bahrain	Oman
Cyprus	Qatar
Georgia	Saudi Arabia
Iraq	Syrian Arab Republic
Israel	Turkey
Jordan	United Arab Emirates
Kuwait	Yemen

Appendix IV – Brief Notes from the Review and Evaluation Process

Some Canadian statistics are included as a yardstick and to provide a familiar comparison. Country context information was largely gleaned from the CIA World Factbook, and the subsequent data was accumulated through review of project reports and the literature (formal and grey), as well as on-site interviews and observations. Comments reflect project status at the time of the visit.

Section 1.   PAN *RnD* Grants

India

Country Context

The Indus Valley civilization, one of the oldest in the world, dates back at least 5,000 years. Merger of Aryan tribes with the earlier Dravidian inhabitants from about 1500 BC created the classical Indian culture.

India is a large land mass that experiences a climate that varies from tropical monsoon in the south to temperate in the north. An area of 3,287,590 sq km *[Canada = 9,984,670 sq km]* is occupied within 7,000 km of coastline (including the Arabian Sea and the Bay of Bengal), and borders with Bangladesh (4,053 km), Bhutan (605 km), Burma (1,463 km), China (3,380 km), Nepal (1,690 km), and Pakistan (2,912 km). Terrain is upland plain (Deccan Plateau) in the south, flat to rolling plain along the Ganges, deserts in the west, and Himalayan mountains in the north (highest elevation being for Kanchenjunga at 8,598 m). Depending upon location, the country is impacted by droughts, flash floods, widespread and destructive flooding from monsoonal rains, severe thunderstorms, and earthquakes.

The Indian population is 1,095,351,995 *[Canada = 33,098,932]* (July 2006 estimates), with 30.8% being 0-14 years, 64.3% being 15-64 years, and 4.8% aged 65 years and over, and the median age being 24.9 years *[Canada = 38.9]*. Infant mortality is 22.81 deaths/1,000 live births *[Canada = 4.69]*, and life expectancy at birth is 70.21 years *[Canada = 80.22]*. HIV / AIDS prevalence is less than 0.9%, with 5.1 million people living with AIDS / HIV and 310,000 deaths (2001 estimates) *[Canada = 0.3%, 56,000, and 1,500, respectively – 2003 estimates]*. Major food or waterborne infectious diseases are bacterial diarrhea, hepatitis A and E, and typhoid fever, with major vector-borne diseases being dengue fever, malaria, and Japanese encephalitis (high risks in some locations), and rabies representing a risk of animal contact disease.

Hindi is the official national language and primary tongue for 30% of the population, but English enjoys associate status and is the most important language for national, political, and commercial communication. There are 14 other official languages. Literacy (defined as those aged 15 and over that can read and write) is 59.5% with a significant male dominant gender disparity *[Canada = 99% with gender equality]*. The capital is New Delhi, and there are 28 states and 7 union territories. The labour force of India is about 496.4 million (2005 estimate), who work in the agriculture (60%), industry (17%), and service (23%) sectors (1999 estimates). About 25% of the population live below the poverty line, and the Per Capita GDP is $3,400 USF *[Canada = $33,900 USF]* (2005 estimate).

About 49.75 million fixed telephone lines exist in India (4.5%) *[Canada = 18.3 million; 55%]*, with 69.19 million cell phones (6.3%) *[Canada = 16.6 million 50.2%]* (2005 and 2006 estimates, respectively). India's communications system has been described as undergoing rapid change due to recent deregulation and liberalization of telecommunications laws and policies. Local and long distance service is provided throughout all regions of the country (primarily in urban areas), and is steadily improving, however telephone density remains low at about 7 per 100 persons nationwide (only 1 per 100 persons in rural areas) with a national waiting list of over 1.7 million. As a result of the latter, the fastest growth is in cellular service with modest growth in fixed lines. Domestic service has improved in recent years with significant trunk capacity added in the form of fiber-optic cable and one of the world's largest domestic satellite systems (the Indian National Satellite system (INSAT), with five satellites supporting 33,000 very small aperture terminals

(VSAT)). There are about 787,543 Internet hosts *[Canada = 3,525,392]*, and 60 million Internet users (5.5%) *[Canada = 21.9 million; 66.2%]* (2005 estimates).

PROJECT I   "Using ICT to build capacities of HIV/AIDS Service Providers in India"

Primary Key Informant Interviews were conducted with individuals directly associated with the initiative on Tuesday 22nd August 2006 at their offices in the Tamilnadu Centre, Aminjikarai, Chennai, India. These included: L. Ramakrishnan, PhD, Country Director, Programs and Research; B. Velasini, MSc, MPhil, Project Coordinator, Training and Content Development; J. Fredrick, Program Manager, ARV Technical Assistance. Documents reviewed included: Using ICT to Build Capacities of HIV/AIDS Service Providers in India: Project Proposal. These provided perspective regarding rationale and intent of the proposed project, including anticipated goals, objectives, and outputs of the study.

Commentary
SAATHI, founded in 2000, is a capacity building organization, and thus does not provide services to HIV/AIDS victims, but instead educates and supports those who work with them. The group disseminates information, encourages and supports networking, provides training and technical assistance, and participates in advocacy activities. Information is made accessible through a searchable data base in an on-line resource centre (ORC), to which new material can be contributed. The website also has a Bulletin Board, e-forums, and an associated mailing list. Under the one roof of SAATHI, various educational services are provided, including for nutrition information, and domestic violence. On-line training modules are made available: e.g. "ICT's for capacity building of NGO's", a new Paediatric Counselling Training Program has been developed, which includes pre and post testing, and a 12 module evaluation and monitoring program.

The project has weathered many challenges, amongst them language limitations, limited Internet access, resource allocation difficulties, and staff limitations for host institutions.

- ➤ Knowledge production
    - o A poster was presented at the International AIDS Conference in Canada during 2006 (ICT for HIV / AIDS Knowledge Transfer).
    - o A poster was presented 21st October 2005 at the International AIDS Conference in India.
    - o Brochures have been prepared and distributed
- ➤ Research targeting, capacity building, and absorption
    - o SAATHI had more of a research approach and perspective than most other projects visited. Given their existing and clear focus, the results from this study will be used to support future initiatives, although precise evidence was unavailable. Similarly, capacity building and absorption occurred naturally given the nature and structure of the organization.
- ➤ e-Health solution adoption, or integration
    - o The lessons learned will be absorbed and applied.
- ➤ Informing policy
    - o Policy is influenced in a circuitous manner, through disseminating information at UNAIDS fora.
- ➤ Broader community, institutional, or country benefit
    - o Invitations are received regularly to participate in workshops and seminars.
- ➤ Health benefits to individuals or the population

      o   No clear evidence of benefit to patients or the population was available.

Sustainability
It is clear that SAATHI is sustainable. The e-health study undertaken was very much a 'project' from which lessons will be learnt, but will not itself be sustained.

PROJECT II   **"ICT Enabled Life Skill and Sexuality Education for Adolescent Girls"**

Primary Key Informant Interviews were conducted with two individuals directly associated with the initiative on Monday 21st August 2006 at the CWDR location in Chennai, India. These people were: Mr. V. Balakrishnan and Mrs. K.R. Renuka. In addition, the consultant was introduced to a group of about 20 young women attending the program, and volunteers supporting the program. Documents reviewed included: ICT Enabled Life Skill and Sexuality Education for Adolescent Girls: Project Proposal.. These provided perspective regarding rationale and intent of the proposed project, including anticipated goals, objectives, and outputs of the study.

Commentary
This CWDR (Centre for Women's Development and Research) focuses on helping young adolescent women aged 12-18 years of age. Thirty-five percent of adolescents are out of school by Grade 6, and most are married by 18 years, despite the official age for marriage being 21.

CWDR began in 1993 through the activities of two women who recognized that many adolescents do not know their individual rights (e.g. related minimum wage; basic human rights), and started some programs to assist. The recent Tsunami brought more adolescents from the coast to the inner city, increasing the need for many to transfer their skills from selling fish to other skills (the CDWR provides diverse training to these young women, including dress making, paper and paper-product making, and now ICT skills). For the study, two areas were selected, one urban and one rural. Focus groups were performed to determine the level of knowledge and socio-cultural status of young women, Based upon this perspective, educational modules and training programs were developed, which included the use of ICT tools (e.g. computers and Web use).

The program has faced and overcame several issues, including connectivity and power problems (a power failure occurred during the site visit), and the need for an understanding of English to use computers and the web. The study produced a dedicated website for the project, which was created as several modules (e.g. covering hygiene, sex education, etc.) that were then translated to Tamil. Translation into the local language was not initially planned, but subsequently recognized to be essential (this website is perhaps the first – or only – website in the Tamil language). The school has provided training and support to about 700 adolescents. The formal launch of the website had been postponed due to recent elections, and was to take place the month after the site visit (i.e. during September 2006).

  ➢ Knowledge production
        o   Beyond the reports produced for IDRC, the project developed and published a CD and website to disseminate information for adolescent women, ensuring some legacy.
  ➢ Research targeting, capacity building, and absorption
        o   Capacity building has occurred within CWDR (from 2 to over 30; 2 supervisors, 3 coordinators [trained in ICT use], and up to 30 field level staff who are beginning

their 1 month training). How much of this can be attributed to the IDRC funded project is unclear.

➢ e-Health solution adoption, or integration
  o The adolescent sexuality program has become routinely adopted and integrated within CWDR, but not more broadly. Of relevance is the expressed desire to awaken awareness of ICT and e-health amongst other NGO's.
➢ Informing policy
  o No formal government policy document has been developed. There is a recognized need and plan for follow-up in the filed with parents and organizations (including schools).
➢ Broader community, institutional, or country benefit
  o Not at this time. Broader community benefit may occur after efforts to promote the program in schools have taken effect.
➢ Health benefits to individuals or the population
  o No specific evaluation had taken place or was planned. No individual benefits were discerned during the site visit, although discussion (some in English, some translated) with the group of adolescents present clearly demonstrated their individual and collective confidence, sexuality awareness, and ICT skills.

Sustainability

The CWDR as an entity develops 50% of their own income by charging for the ICT training, and pursuing other income generating activities (e.g. through the dressmaking skills taught). In regard to the project, they are planning on publicising and promoting the CD and website-based modules to local schools in the region (there are about 2,000 schools, all of which have been given computers by the local government). This process could be strengthened by performing a survey to understand how adolescent education is currently performed, and then a second survey after the use of the website has been adopted and integrated by local schools.

Of note was the need expressed for a 'technology guru', since at this time they depend upon volunteers (e.g. they expressed a desire to develop their own software, and understand more about Linux and how they might use it), and do not understand how to move forward (in terms of technology). Also, the issue of importation of computers without excise duty was raised, as this drains financial resources. These directions may represent new opportunities for consideration by IDRC.

Indonesia

Country Context

Indonesia is the world's largest archipelagic state, with 17,508 islands (6,000 inhabited), and is home to the world's largest Muslim population.

Terrain is mostly coastal lowlands; larger islands have interior mountains. The archipelago experiences a climate that varies from tropical, to hot and humid, to a more moderate climate in the highlands. Depending upon location, the country is impacted by occasional floods, severe droughts, tsunamis, earthquakes, volcanoes, and forest fires. An area of 1,919,440 sq km *[Canada = 9,984,670 sq km]* is occupied within 54,716 km of coastline, and borders with East Timor 228 km, Malaysia 1,782 km, and Papua New Guinea 820 km. The Indonesian archipelago lies between the Indian Ocean and the Pacific Ocean.

The Indonesian population is 245,452,739 *[Canada = 33,098,932]* (July 2006 estimates), with 28.8% being 0-14 years, 65.8% being 15-64 years, and 5.4% aged 65 years and over, and the median age being 26.8 years *[Canada = 38.9]*. Infant mortality is 34.39 deaths/1,000 live births *[Canada = 4.69]*, and life expectancy at birth is 69.87 years *[Canada = 80.22]*. HIV / AIDS prevalence is less than 0.1%, with 110,000 people living with AIDS / HIV and 2,400 deaths (2003 estimates) *[Canada = 0.3%, 56,000, and 1,500, respectively – 2003 estimates]*. Major food or waterborne infectious diseases are bacterial and protozoal diarrhea, hepatitis A and E, and typhoid fever, with major vector-borne diseases being dengue fever, malaria, and chikungunya (high risk in some locations), and H5N1 avian influenza representing a small risk of animal contact disease.

Bahasa Indonesia (a modified form of Malay) is the official national language, with English, Dutch, and local dialects (primarily Javanese) being spoken also. Literacy (defined as those aged 15 and over that can read and write) is 87.9% with a marked male dominant gender disparity *[Canada = 99% with gender equality]*. The capital is Jakarta, and there 30 provinces (propinsi-propinsi, singular - propinsi), 2 special regions (daerah-daerah istimewa, singular - daerah istimewa), and 1 special capital city district (daerah khusus ibukota); however, following the implementation of decentralization (begun 1 January 2001), the 440 districts or regencies have become the key administrative units responsible for providing most government services. The labour force of Indonesia is about 94.2 million (2005 estimate), who work in the agriculture (46.5%), industry (11.8%), and service (41.7%) sectors (1999 estimates). About 16.7% of the population live below the poverty line, and the Per Capita GDP is $3,600 USF *[Canada = $33,900 USF]* (2005 estimate).

About 12.77 million fixed telephone lines exist in Indonesia (5.0%) *[Canada = 18.3 million; 55%]*, with 46.91 million cell phones (19.1%) *[Canada = 16.6 million 50.2%]* (2005 estimates). Indonesia's domestic communications system has been described as fair, and its international service as good. The domestic service uses an inter-island microwave system and HF radio police net, plus a domestic satellite communications system. There are about 134,735 Internet hosts *[Canada = 3,525,392]*, and 16 million Internet users (6.5%) *[Canada = 21.9 million; 66.2%]* (2005 estimates).

Project III   **"Development of ICT-Based Telemedicine System for Primary Community Health-Care in Indonesia"**

Primary Key Informant Interviews were conducted with individuals directly associated with the initiative on 2 October 2006 at the Department of Electrical Engineering, Institut Teknologi Bandung (ITB), Bandung, Indonesia. These included: Dr. Soegijardjo Soegijoko; Dr. L. Exsenveny; Dr. YS Irawan; and Dr. Ediana Sutjirejeki. In addition to the available IDRC reports, a PowerPoint presentation was provided. Additional site visits were made to local clinics, and to the local City Health Officer (decentralisation of healthcare had taken place about 2 years earlier).

Bandung is the provincial capital of West Java, Indonesia. It is located in the middle of the province, around 180 km south-east of Jakarta. At about 768 m above sea level, its climate is cooler throughout the year than most other cities. The topology of Bandung is shaped like a basin in the middle of a ring of mountains, raising challenges for communications. For the study, this group is focusing on a Primary Health Care using a store and forward initiative (e.g. antenatal care), testing connectivity with 8 locations. High risk pregnancy screening is supported through access to a standard form collecting data such as fetal heart rate, weight, and blood pressure. Some drug management information is collected. An information website has been developed.

The modest evaluation that had taken place showed the system to perform well technically, however little focus had been given to organisational readiness. As a result further system improvements were 'dormant'.

Commentary

An interesting aspect is the effort put into training. Training sessions were periodic (8 groups over several weeks), and typically included about 20 individuals that included physicians, paramedics, administrators, and health officers. The content also appeared comprehensive, explaining not just the process but the rationale also. Yet during site visits it became apparent that the program was not being used (at least at the clinic site visited). Upon questioning it became apparent that the program had been used, and had been demonstrated to provide value, but its use had not persisted. This was despite their understanding of the value both to patients and to them for administrative / planning purposes of the data they could have had available. One reason given was they 'did not have time', yet observing the pace of activity suggested this was not a primary reason. Issues of e-health readiness, change management, and the need for a clinical champion would be more likely explanations.

> ➢ Knowledge production
>> o Posters were seen in the corridor of the Institute, but beyond the reports produced for IDRC, no formal publications were identified.
> ➢ Research targeting, capacity building, and absorption
>> o Given the fact that an existing research team existed, there probably was some research targeting and ongoing capacity building. The training sessions for local healthcare workers had also provided some capacity building, but will become relegated to simply awareness building without continued application.
> ➢ e-Health solution adoption, or integration
>> o Sadly it appeared that the solution was not likely to be adopted or integrated.
> ➢ Informing policy
>> o No formal government policy document has been developed, but the meeting with the local City Health Officer suggested she was certainly aware of and interested in e-health solutions. It was felt they had influence at the City to Provincial levels, not national. If nurtured, this will be important.
> ➢ Broader community, institutional, or country benefit
>> o No evidence of this.
> ➢ Health benefits to individuals or the population
>> o Only very short lived for some of the individuals handled using the system. Beyond this, no evidence.

Sustainability

Without the issues noted earlier being addressed in a structured and ongoing fashion (i.e. e-health readiness, change management, clinical champion), it seems most unlikely that this project will be sustained and transitioned into a viable program. This is a shame, as it appeared to be well designed (technically) and have good potential value for both patient care and administrative planning for the clinics and the now decentralised health authorities.

Project IV **"Development of ICT-Based Mobile Telemedicine System with Multi Communication Links for Urban & Rural Areas in Indonesia"**

Primary Key Informant Interviews were conducted with individuals directly associated with the initiative on both 2 and 3 October 2006. These took place at both the Department of Electrical Engineering, Institut Teknologi Bandung (ITB), Bandung, Indonesia with the same group as for Project III (Dr. Soegijardjo Soegijoko; Dr. L. Exsenveny; Dr. YS Irawan; and Dr. Ediana Sutjirejeki) plus Dr. Allya P. Koesoena and Dr. Edianna Sutjirealjeki, but also with Dr. H. Suberman, Director of the hospital in Sukabumi during a site visit there. In addition to the available IDRC reports, a PowerPoint presentation was provided ('Interim Report - Development of ICT Based Mobile Telemedicine System with Multi Communication Links for Urban and Rural Areas in Indonesia'). Additional site visits were made to local clinics, and to the local Health Officer (decentralisation of healthcare had taken place about 2 years earlier).

For this study, the focus was more on seeking technological solutions (given the poor ICT infrastructure) to address the complex topology of the urban and rural areas of Indonesia (highlands, intervening hills, off shore [island] needs). They wished to develop and test a working mobile telemedicine system prototype that used multiple communication capabilities to connect an ambulance with a main unit in the hospital at Sukabumi. They were collecting basic vital signs data, and looking at ECG recording. It was intended that the solution be used for tele-diagnostics, tele-consultation, and recording patient information, with additional application for distance education and other health care service applications.

Commentary
The researcher was taken by road to Sukabumi, a city and a regency in the highlands of West Java (about 80 km (50 miles) south of Jakarta), located at an altitude of about 600 meters (2000 feet). Sukabumi is a hill station resort, with a cooler climate than the surrounding lowlands. Topology of the local terrain was impressive and challenging – very mountainous with villages (even Sukabumi) often seemingly buried amongst high hills or mountains – and this location had been chosen as being representative of Indonesia.

A key feature of this project is the 'multi-communication' aspect (as a means of addressing the topology issue). Data transaction between the units will be implemented via multiple communication links, namely: radio, internet, GSM/CDMA mobile phones, and fixed phones. This project therefore acts as something of a vanguard project, which should provide sound lessons and 'best practice' for deployment of telehealth solutions in similar environments where the most suitable communication link will depend on the availability of local infrastructure.

Despite the importance of this project to finding a viable technological solution, considerable work remains to be completed before a working and fully tested model of the conceived 'ICT-Based Mobile Telemedicine System' is delivered. For example, although the intent is to have it installed in an ambulance (one has been made available), it had not been designed and built in, pending completion of some of the technical development. However, it was made clear they remained in the data transmission testing period, and had yet to progress to pilot development and evaluation. The goal was to have a prototype to test in January 2007, and to train and test thereafter.

➢ Knowledge production
  o Once more, posters were seen in the corridor of the Institute, but beyond the reports produced for IDRC, no formal publications were identified. Workshops had been held. It is perhaps early to expect formal publications.

- ➢ Research targeting, capacity building, and absorption
  - o Once more, given the fact that an existing research team existed, there probably was some research targeting and ongoing capacity building.
- ➢ e-Health solution adoption, or integration
  - o At the time of the visit, there was no solution to adopt or integrate.
- ➢ Informing policy
  - o No formal government policy document or report had been developed. It was noted that their involvement with the national Medical Health Information Society helped disseminate information, and they were in communication with several intergovernmental agencies.
- ➢ Broader community, institutional, or country benefit
  - o Not at this time.
- ➢ Health benefits to individuals or the population
  - o Not at this time.

Sustainability
Given that the prototype was not even in place, there was little to assess here. It is to be hoped that the issues noted for Project III (i.e. e-health readiness, change management, clinical champion) will also be considered and addressed for this Project too. Given the variety of communication modes being applied, a simple user interface and / or significant (and ongoing) training may be required.

Nepal

Country Context
Nepal is a landlocked country whose terrain is 'Tarai' (a flat river plain of the Ganges) in the south, a central hill region, and rugged Himalayan mountains in the north (containing eight of world's 10 highest peaks, including Mount Everest (at 8,850 m) and Kanchenjunga). The country occupies an area of just 147,181 sq km *[Canada = 9,984,670 sq km]* within 2,926 km of border with China 1,236 km, and India 1,690 km. Nepal's climate varies from cool summers and severe winters in the north, to subtropical summers and mild winters in the south. The country is impacted by severe thunderstorms, flooding, landslides, drought, and famine (depending on the timing, intensity, and duration of the summer monsoons). Nepal faces several issues, including deforestation (overuse of wood for fuel and lack of alternatives), contaminated water (with human and animal wastes, agricultural runoff, and industrial effluents), wildlife conservation, and pollution through vehicular emissions.

The Nepalese population is 28,287,147 *[Canada = 33,098,932]* (July 2006 estimates), with 38.7% being 0-14 years, 57.6% being 15-64 years, and 3.7% aged 65 years and over, and the median age being 20.3 years *[Canada = 38.9]*. Infant mortality is 65.32 deaths/1,000 live births *[Canada = 4.69]*, and life expectancy at birth is 60.18 years *[Canada = 80.22]*. HIV / AIDS prevalence is less than 0.5%, with 61,000 people living with AIDS / HIV and 3,100 deaths (2003 estimates) *[Canada = 0.3%, 56,000, and 1,500, respectively – 2003 estimates]*.

A 2001 census identified that Nepali was the most common language (spoken by 47.8%), with other languages including Maithali 12.1%, Bhojpuri 7.4%, Tharu (Dagaura/Rana) 5.8%, Tamang 5.1%, Newar 3.6%, Magar 3.3%, Awadhi 2.4%, other or unspecified languages 12.5%. English is also spoken within government and business communities. Literacy (defined as those aged 15 and over that can read and write) is 48.6% with a significant male dominant gender disparity *[Canada*

= 99% with gender equality]. The capital is Kathmandu, and 14 anchals (zones) constitute the administrative divisions of Nepal. The labour force of Nepal is about 10.4 million - exhibiting a severe lack of skilled labour - (2005 estimate), who work primarily in the agriculture (71.6%) sector, as well as the industry (6%), and service (18%) sectors. About 31.4% of the population live below the poverty line, and the Per Capita GDP is $1,400 USF *[Canada = $33,900 USF]* (2005 estimates).

About 448,600 fixed telephone lines exist in Nepal (1.6%) *[Canada = 18.3 million; 55%]*, with 248,800 cell phones (0.88%) *[Canada = 16.6 million 50.2%]* (2005 estimates). Nepal's communications system consists of a poor telephone and telegraph service, and a fair radiotelephone communication service and mobile cellular telephone network. There are about 7,846 Internet hosts *[Canada = 3,525,392]*, and 112,500 Internet users (0.4%) *[Canada = 21.9 million; 66.2%]* (2005 estimates).

Project V   "Telemedicine in Nepal: a pilot project"

Primary Key Informant Interviews were conducted with many individuals (perhaps 20) associated with the initiative on 23rd August 2006 thanks to a presentation organized by Dr. Pradhan, which took place at the Shangri La Hotel, Kathmandu, Nepal. Those present included: Dr. Mohan Pradhan; Dr. Rajech Kumar Shakya (CEO, Hi-Tech Valley i-Net); and Dr. Ramesh Prasad Aacarya (President, AMDA Nepal). In addition, a site visit (by air) to hospitals (Koshi Zonal Hospital) and refugee camps in or near Biratnagar (south-east of Kathmandu) was arranged for the 24th and 25th August 2006.

Commentary
The concept of HealthNet Nepal (http://www.healthnet.org.np/) was to support Primary Health Care (which struggled) and to counteract the high ICT cost and limited infrastructure through research into options. The IDRC grant was one of many they had received to fund their work. At this time there was a heavy bias towards imaging technologies; so they had explored applications in telereadiology, telepathology, teledermatology, and telecardiology. They pursued both basic and clinical research. A comprehensive electronic medical record structure was presented, and a series of training manuals that had been developed were presented also (a few in the final throes of preparation). This gave the project substance, and an indication that it may well be sustainable. Of all of the projects, this was one of perhaps two that demonstrated a clear research / evaluation activity. For example, here data was presented from 521 cases from a non-randomised study. Available infrastructure was

- ➢ Knowledge production
    - o The impression was given that many publications had been made, although only a small number could be found through a Google search; this knowledge production goes beyond just the IDRC project, and concerns HealthNet Nepal activities overall. Certainly they have a good website (http://www.healthnet.org.np/), but much of the content is password protected and not freely available (even the newsletter). They also actively participate in Nepalese and Asian conferences.
- ➢ Research targeting, capacity building, and absorption
    - o Similar to other projects, but more clearly so here, an existing research team existed. As a consequence there was some research targeting and ongoing capacity building.
- ➢ e-Health solution adoption, or integration
    - o HealthNet Nepal is very much an applied research activity, hence the solutions were in the process of being adopted and used. The degree of integration was unclear, and

> may require additional time to truly assess. But it appeared that between Kathmandu and Biratnagar there was demonstrable e-health activity.

- ➢ Informing policy
  - o No formal government policy document or report had been developed related to this project, nor was there a clear strategy described for aiding decision- or policy-making based upon the study. It did appear that 'members' of HealthNet Nepal were influential with the government and industry sectors, and therefore lessons from the project may indirectly influence decision- and policy-making.
- ➢ Broader community, institutional, or country benefit
  - o It seemed that HealthNet Nepal was poised to expand their work and activity, and therefore may soon have broader impact.
- ➢ Health benefits to individuals or the population
  - o Although a few anecdotal examples were provided, there was no clear evidence of individual or population impact.

Sustainability

There is every likelihood that the IDRC funded activity will continue and become sustainable within the overall activities being pursued by HealthNet Nepal.. This view is taken primarily for three reasons. First, the group seems determined to implement e-health solutions, and are actively using VSAT and fibre optic media to provide adequate bandwidth for future applications. Second, their approach seems sufficiently comprehensive (e.g. physician involvement, well thought through training, awareness raising activities, collaboration with other individuals and groups, and seeking of inexpensive solutions) as to bode well for developing long-term solutions. Third, they appear to learn from past experience (e.g. noting that real-time solutions are difficult for now; moving towards web-based solutions; understanding the need to work with the government to promote e-health solutions).

Pakistan

Country Context

Pakistan borders the Arabian Sea, and is located between India on the east, Iran and Afghanistan on the west, and China in the north. The country's terrain is flat Indus plain to the east, mountains in the north and northwest, and Balochistan plateau in the west. Pakistan occupies an area of 803,940 sq km *[Canada = 9,984,670 sq km]* within 6,774 km of border (with Afghanistan 2,430 km, China 523 km, India 2,912 km, Iran 909 km), and 1,046 km of coast line. Climate is mostly hot, dry desert, with temperate conditions in northwest, and arctic conditions in the north. The country is impacted by frequent earthquakes (occasionally severe, especially in the north and west), and flooding along the Indus after heavy rains (July and August). Issues facing Pakistan include water pollution, limited natural fresh water resources (most of the population lack access to potable water), deforestation, soil erosion, and desertification,

The population of Pakistan is 165,803,560 *[Canada = 33,098,932]* (July 2006 estimates), with 39% being 0-14 years, 56.9% being 15-64 years, and 4.1% aged 65 years and over, and the median age being 19.8 years *[Canada = 38.9]*. Infant mortality is 70.45 deaths/1,000 live births *[Canada = 4.69]*, and life expectancy at birth is 63.39 years *[Canada = 80.22]*. HIV / AIDS prevalence is less than 0.1%, with 74,000 people living with AIDS / HIV and 4,900 deaths (2001 and 2003 estimates) *[Canada = 0.3%, 56,000, and 1,500, respectively – 2003 estimates]*. Major food or waterborne infectious diseases are bacterial diarrhea, hepatitis A and E, and typhoid

fever, with major vector-borne diseases dengue fever, malaria, and cutaneous leishmaniasis (high risk in some locations), and rabies representing a small risk of animal contact disease.

Punjabi is the most common language (spoken by 48%), with Sindhi 12%, Siraiki (a Punjabi variant) 10%, Pashtu 8%, Urdu (the official language) 8%, Balochi 3%, Hindko 2%, and Brahui 1%. English is the official language of the Pakistani elite and most government ministries. Literacy (defined as those aged 15 and over that can read and write) is 48.7% with a significant male dominant gender disparity *[Canada = 99% with gender equality]*. The capital is Islamabad, and 4 provinces, 1 territory, 1 capital territory constitute the administrative divisions of Pakistan (the Pakistani-administered portion of the disputed Jammu and Kashmir region also consists of two administrative entities: Azad Kashmir and Northern Areas). The labour force is about 46.84 million (2005 estimate), who work in the agriculture (42%), industry (20%), and service (38%) sectors. About 32% of the population live below the poverty line (2001 estimate), and the Per Capita GDP is $2,400 USF *[Canada = $33,900 USF]* (2005 estimates).

About 5.28 million fixed telephone lines exist in Pakistan (3.18%) *[Canada = 18.3 million; 55%]*, with 12.771 million cell phones (7.7%) *[Canada = 16.6 million 50.2%]* (2005 estimates). Pakistan's domestic communication system has been described as mediocre, but improving, with service adequate for government and business but still not readily available to the majority of the rural population. There are about 38,309 Internet hosts *[Canada = 3,525,392]*, and 10.5 million Internet users (6.3%) *[Canada = 21.9 million; 66.2%]* (2005 estimates).

Project VI : "Information & Communication Technologies (ICTs) Assisted Learning Tool for Deaf in Pakistan."

Primary Key Informant Interviews, coordinated by Mr. George Sadiqui of IUDC, were conducted with four individuals directly associated with the initiative on Friday 18th August 2006 at the IUCN Headquarters in Karachi, Pakistan. These individuals were: Mr. Mahmood Akhtar Cheema (Head, P-ELG Constituency, Sindh and AJK Programmes, IUCN); Mr. Saquib Hanif (Head, Education, Communication, and Knowledge Management Group, IUCN); Mr. Sabahat Saeed Khan (now Manager Development Communication, NGO Resource Centre; Project of the Aga Khan Foundation); and Mr. George Sadiqui.

Beyond the available IDRC reports, a significant amount of written material was provided. Some related to the current project, while much concerned other aspects of IUCNs activities (see Table below). IUCN, the World Conservation Union, a science-based environmental organisation, exists "to influence, encourage, and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any natural resource is equitable and ecologically sustainable". With this backdrop, there was a clear feeling that the IDRC funded initiative was not considered 'ICT and health' or 'e-health' related, and some confusion existed around the visit. Discussion took place regarding the expansive nature of e-health.

At first glance this project seemed an unlikely selection for funding. However, understanding the relationship of SDNP to the IUCN (and the connection of SDNP with ICT and development in Pakistan) clarified the seeming anomaly to some extent. Formerly a global program of UNDP, SDNP has been working since 1992 to promote access to information on sustainable human development among different sectors of society. It claims to have been the pioneer of e-mail and offline Internet in Pakistan. Recently its focus has been on developing knowledge management systems to strengthen development information services in Pakistan. SDNP launched the Pakistan Development Gateway (PDG), and has trained more than 260 organizations from the

development sector to set up, maintain and update their websites, in Urdu and Sindhi, contributing significantly to the local content about Pakistan on the Web.

PSL (Pakistan Sign Language) contains approximately 4000 different gestures, confounded by multiple variations introduced by language and dialect differences across the country. This project aimed to establish greater uniformity, and enhance access to, and use of, PSL for improving literacy of the deaf . ICTs were used as the communication and learning medium, and explored the potential of ICT based PSL assisted teaching and learning. Phase-1 explored, developed and classified a PSL symbols set, including a unique contribution through introducing signs that addressed environmental issues. Phase-II work pertains to modeling of PSL for CD packs using the Web medium, and development of converter software (Urdu alphabets to PSL) and PSL font structure. Phases II and IV focused on research to evaluate the multiple teaching approaches involving ICTs and exploring the various options of online/offline instruction techniques for the deaf. The study resulted in development of a quality CD based learning tool for the hearing impaired, which is now being distributed through the Pakistan Association of the Deaf for the benefit of the community.

Documents Provided by IUCN	
Documents	**Information Retrieved**
Sulman N, Zuberi S. Hearing Impairment – Causes & Implications on Behavior & Learning. Sustainable Development Networking Programme, Pakistan. IUCN- The World Conservation Union.	A deliverable under the compiled under the Pan Asia funded ICT R&D Grant Project. Intended to assist educators, related staff, and parents, and also intended to contribute in the development of ICT learning tools. Provided evidence of project benefit.
Information and Communication Technologies (ICT) Assisted Learning Tools for Deaf in Pakistan: Project proposal.	Perspective regarding rationale and intent of proposed project, including anticipated goals, objectives, and outputs of the study.
Information and Communication Technologies (ICT) Assisted Learning Tools for Deaf in Pakistan: Progress Report.	Description of results of Phase I of project.
Khan SS. ICT Assisted Learning Tool for the Deaf in Pakistan; Final Project Report. September 2004.	Description of results of all phases of project.
ICT Assisted Learning Tool for Deaf in Pakistan. [Website]	Project deliverable.
Earthquake in Pakistan: An Assessment of Environmental Risks and Needs. 16th January 2006..	Description of results of an early assessment from IUCN's perspective.
IUCN – The World Conservation Union (undated)	Information brochure.
Silent Revolution: An Impact Analysis of Integrated Environmental Rehabilitation Measures Applied by the ERNP in Dir Kohistan. ERNP Case Studies – 2004.	Description of the Environmental Rehabilitation in NWFP and Punjab (ERNP) program.

Documents Provided by IUCN	
Documents	**Information Retrieved**
Green and Growing: An Impact Analysis of Environmental Rehabilitation Work Carried Out by the ERNP Upland Rehabilitation and Development Project (URDP) in Murree, Kahuta, and Kotil Sattian. ERNP Case Studies – 2004.	Description of the Upland Rehabilitation and Development Project (URDP).
Moving the Frontier: The Story of the Sarhad Provincial Conservation Strategy. International Institute for Sustainable Development (IISD) 2002.	Description of the Sarhad Provincial Conservation Strategy (SPCS).
SPCS Reloaded – Report of the External Review Team. March 2004	A report that examines the Sarhad Provincial Conservation Strategy (SPCS), in particular the strategy's effectiveness and validity in the changed context nearly 10 years later.
Biodiversity Action Plan for Pakistan: A Framework for Conserving our Natural Wealth. 2000.	Presents 13 components, aligned with the Convention on Biological Diversity (CBD), that collectively guides conservation of habitat, home to rare animals and plants within Pakistan, and slows loss of biodiversity.
Chitral: An Integrated Development Vision. 2004.	Provides a community driven 10-year plan for development of the Chitral area, supported through a Chitral Fund for Sustainable Development, and investment and support from national and jurisdictional governments..
Balochistan Conservation Strategy. 2000.	Provides comprehensive description of a specific building blocks and clear implementation strategy for a framework intended to preserve the Balochistan environs in the face of modern change and development.
The Pakistan National Conservation Strategy (PNCS).	Promotes a plan with 14 Programme Areas for development of Pakistan within the context of a national environmental plan that preserves natural resources and the environment to support future development.
Hussaini – Oasis on the Karakoram Highway. MACP (Mountain Areas Conservation Project)	Brochure describing a 7-year project to protect biodiversity of the Karakoram, Hindu Kush, and western Himalaya ranges through community-based conservation efforts, including eco-tourism and mountain trekking opportunities.
Khunjerab – Where Ibex Live and Snow Leopards Roam. MACP (Mountain Areas Conservation Project)	Brochure describing a 7-year project to protect biodiversity of the Karakoram, Hindu Kush, and western Himalaya ranges through community-based conservation efforts, including eco-tourism and mountain trekking opportunities.

Documents Provided by IUCN	
Documents	**Information Retrieved**
Misgar – Trekking along the Ancient Silk Route. MACP (Mountain Areas Conservation Project)	Brochure describing a 7-year project to protect biodiversity of the Karakoram, Hindu Kush, and western Himalaya ranges through community-based conservation efforts, including eco-tourism and mountain trekking opportunities.
Chapursan – Valley of Dragons and Saints. MACP (Mountain Areas Conservation Project)	Brochure describing a 7-year project to protect biodiversity of the Karakoram, Hindu Kush, and western Himalaya ranges through community-based conservation efforts, including eco-tourism and mountain trekking opportunities.
Ghulkin and Gulmit – Gojal's Cultural Centers. MACP (Mountain Areas Conservation Project)	Brochure describing a 7-year project to protect biodiversity of the Karakoram, Hindu Kush, and western Himalaya ranges through community-based conservation efforts, including eco-tourism and mountain trekking opportunities.
Khyber – The Unknown Paradise. MACP (Mountain Areas Conservation Project)	Brochure describing a 7-year project to protect biodiversity of the Karakoram, Hindu Kush, and western Himalaya ranges through community-based conservation efforts, including eco-tourism and mountain trekking opportunities.
Passu – Magnificent Glaciers and Mighty Peaks. MACP (Mountain Areas Conservation Project)	Brochure describing a 7-year project to protect biodiversity of the Karakoram, Hindu Kush, and western Himalaya ranges through community-based conservation efforts, including eco-tourism and mountain trekking opportunities.
Adventure Land; Shimshal – Discover the Shimshal Pamir. MACP (Mountain Areas Conservation Project)	Brochure describing a 7-year project to protect biodiversity of the Karakoram, Hindu Kush, and western Himalaya ranges through community-based conservation efforts, including eco-tourism and mountain trekking opportunities.
Professional Codes of Ethics and related professional policy statements (physicians, nurses, etc)	Information about the policy requirements from the perspective of the professions involved.
Managing Risk. NGO Resource Centre (A Project of Aga Khan Foundation) June 2006.	
Annual Report 2004. NGO Resource Centre.	

Commentary

The study final report notes the impact of this study as follows: "The tools developed through the process of the project have introduced a major incremental step in the overall learning designs for the deaf. ICT is being taken as a tool for empowerment and our efforts have contributed to that. The launching ceremony of the CD was attended by many dignitaries who will influence on the

development process. The children, teachers and parents of deaf children have appreciated the efforts and they will be the main advocates. In the context of environment and conservation – the major impact pertains to the introduction of environmental signs in the Pakistan Sign Language."

Interviewees were unable to assist in identifying institutions or individuals who might have interests in e-health research. Clearly benefits have been delivered through the project, but in terms of the approach adopted for this study, benefits are less distinct.

> Knowledge production
>> o Beyond the formal reports to IDRC, a CD had been produced and a website had been constructed which provided a picture gallery of the signs, as well as additional functionality.
> Research targeting, capacity building, and absorption
>> o No further e-health related activities had been planned. The performance of the project had provided limited capacity building.
> e-Health solution adoption, or integration
>> o The group did have the National Institute for Special Education and the Pakistan Association for the Deaf on side with the project. However, the tool had not been formally adopted by Pakistan or integrated into care of the deaf in Pakistan.
> Informing policy
>> o No documents or meetings with government officials had been pursued in relation to influencing policy as a result of this new tool.
> Broader community, institutional, or country benefit
>> o A standardized Urdu sign language has been developed, that includes health signs, and a unique contribution through development and standardisation of signs related to environmental issues.
> Health benefits to individuals or the population
>> o No health benefits to individuals or the population were demonstrated.

Sustainability

The group admitted to have fallen short in terms of awareness building and broad dissemination regarding the tool. What has been achieved here holds good lessons, practical guidance (process for creation, consultation, discussion, and consensus for environmental signs), and potentially a core of about 500 signs that could be reconfigured to other languages and for other countries.

IUCN is a large and experienced organisation who remains a potential partner for IDRC and e-health initiatives. However, this RnD project does represent something of an anomaly. Although as has been shown, the project can be viewed as e-health, it was an initiative not in-line with the mainstream activities of the recipient organisation. An understanding of the distant relationship was shown during the interviews when it was explained that the initiative achieved several 'firsts', one of which was development and standardisation of signs for the deaf community related to the environment and environmental issues. Given the importance of a healthy environment to the health of any community, it is recommended - with caution - that where a direct health related relationship can be demonstrated, IDRC should consider funding such initiatives where meritorious and well designed.

Philippines

Country Context

The Philippines is an archipelago that experiences a tropical marine climate, impacted by northeast monsoons from November to April, and southwest monsoons from May to October. An area of 300,000 sq km *[Canada = 9,984,670 sq km]* is occupied within 36,289 km of coastline. Terrain is mostly mountainous, with narrow to extensive coastal lowlands. The Philippine archipelago is made up of about 7,100 islands located in relation to many of Southeast Asia's main water bodies: the South China Sea, Philippine Sea, Sulu Sea, Celebes Sea, and the Luzon Strait. The country lies within a typhoon belt, and is usually 'affected' by 15 and 'struck' by 5-6 cyclonic storms per year; the country also experiences natural disasters such as landslides, volcanic activity, destructive earthquakes, and tsunamis. The Philippines face several issues, including uncontrolled deforestation, soil erosion, air and water pollution in major urban centers, coral reef degradation. and increasing pollution of coastal mangrove swamps (important fish breeding grounds).

The Philippine population is 89,468,677 *[Canada = 33,098,932]* (July 2006 estimates), with 35% being 0-14 years, 61% being 15-64 years, and 4% aged 65 years and over, and the median age being 22.5 years *[Canada = 38.9]*. Infant mortality is 22.81 deaths/1,000 live births *[Canada = 4.69]*, and life expectancy at birth is 70.21 years *[Canada = 80.22]*. HIV / AIDS prevalence is less than 0.1%, with only 9,000 people living with AIDS / HIV and only less than 500 deaths *[Canada = 0.3%, 56,000, and 1,500, respectively]* (all 2003 estimates). Major food or waterborne infectious diseases are bacterial diarrhea, hepatitis A, and typhoid fever, with major vector-borne diseases being dengue fever and malaria (high risk in some locations) and rabies representing a risk of animal contact disease.

The two official languages are Filipino (based on Tagalog) and English, and 8 major dialects exist. Literacy (defined as those aged 15 and over that can read and write) is 92.6% with no gender disparity *[Canada = 99% with gender equality]*. The capital is Manila, and there are 79 provinces and 117 chartered cities. The labour force of the Philippines is about 36.73 million (2005 estimate), and work in the agriculture (36%), industry (16%), and service (48%) sectors (2004 estimates). About 40% of the population live below the poverty line, and the Per Capita GDP is $4,700 USF *[Canada = $33,900 USF]* (2005 estimates).

About 3.44M fixed telephone lines exist in the Philippines (3.8%) *[Canada = 18.3 million; 55%]*, with 32.81 million cell phones (36.7%) *[Canada = 16.6 million 50.2%]* (2005 estimates). The communications system in the Philippines has been assessed as having good international radiotelephone and submarine cable services with adequate domestic and inter-island service. The domestic satellite system has 11 earth stations. There are about 96,500 Internet hosts *[Canada = 3,525,392]*, and 7.82 million Internet users (8.7%) *[Canada = 21.9 million; 66.2%]* (2005 estimates).

| Project VII | **"A Community-based Child Injury Surveillance System: Rapid Data Collection Using (Short Messaging Service (SMS)"** |

A Primary Key Informant Interview was held with Dr. Alvin Marcelo, directly associated with the initiative, on 27 September 2006 in Makati City, Manila, Philippines. Additional conversations were held with users at two locations within Pasay, Metro Manila. Beyond the available IDRC reports (proposal, interim, and final), no other material was reviewed.

The Medical Informatics Unit, University of the Philippines, implemented an electronic health information system at two health centres in Pasay City, Metro Manila. The main objective was to design and develop an extensible and customizable computer-based information system at the health centre level using open-source tools. This was in response to recognized difficulties in the traditional paper-based system of collecting data, which reduced confidence by providers and patients in resulting policy direction and strategy based on that data.

Commentary

This study had morphed as a result of reasonably early recognition of changing local need. This shift is described in the Interim Report to IDRC (http://www.idrc.ca/uploads/user-S/11472712051Child_Injury_Surveillance_Interim_Report.pdf). The focus became development of a program referred to as CHITS - Community Health Information Tracking System. The rationale behind this study is compelling. The current paper based tracking system is not seen to offer any local benefit and is viewed as an irrelevant nuisance; as a result data contributed is sometimes manufactured by local healthcare personnel, meaning they know not to have faith in the reports generated from that system. A vicious cycle has been created. Developing a new approach with their participation encourages contribution of reliable data, which is reinforced when they receive immediate benefit from the reports generated locally. This situation – and the solution – is not likely to be isolated to only Manila or to only the Philippines. Lessons learnt may have extensive value.

- ➢ Knowledge production
    - o Beyond the formal reports to IDRC, presentations had been given regarding the initiative, but no formal publications were noted during the interview.
- ➢ Research targeting, capacity building, and absorption
    - o No specific further e-health related activities had grown out of this particular project, but expansion of CHITS was planned. Performance of the project had provided awareness amongst a small number of healthcare personnel, limited capacity building within the research group.
- ➢ e-Health solution adoption, or integration
    - o There appeared every intention to expand CHITS therefore it is likely that adoption and integration will occur in due course.
- ➢ Informing policy
    - o No documents were shown, but meetings with government officials had taken place and showed promise for expansion of CHITS.
- ➢ Broader community, institutional, or country benefit
    - o At this time there was only evidence of impact and user satisfaction in the two sites visited. Broader impact can be anticipated if CHITS is adopted elsewhere.
- ➢ Health benefits to individuals or the population
    - o No systematic outcomes based evidence was available, although anecdotal evidence suggested individual benefit, and some benefit (e.g. immunization tracking) for the population served by these clinics.

Project VIII   M-DOK: Mobile Telehealth and Information Resource System for Community Health Workers

A Primary Key Informant Interview was conducted with Ayedee Ace Domingo, MD; Managing Director, Synapse Health Solutions, who was directly associated with the initiative, on 29th September 2006 at the Marriott Hotel, Makati City, Philippines. Beyond the IDRC proposal and interim report, no additional material was available for review.

Commentary
This study has developed a modest and functional user-friendly graphical interface to support a mobile telehealth information system over SMS, in order to provide a low cost solution to areas without Internet connectivity. A primary goal is to establish the capability to transmit real-time diagnosis and treatment data from remote community healthcare workers at the point of care, to a physician located in an urban location. In addition, another goal is to provide access to information for remote healthcare providers. The basic software, on a simple mobile telephone, was examined and tested during the site visit. When fully functional, it will provide pertinent health information content for rural users customized to the mobile screen, although no demonstration of the information to be loaded onboard the multimedia card was given.

➢ Knowledge production
  o The interim report is considered proprietary, and for internal IDRC use only. No other reports or journal articles have been prepared.
➢ Research targeting, capacity building, and absorption
  o Clear interest in future e-health solutions, no evidence of capacity building provided.
➢ e-Health solution adoption, or integration
  o Product development stage; too early for evidence of any adoption or integration.
➢ Informing policy
  o No evidence of preparation of policy documents or government interaction.
➢ Broader community, institutional, or country benefit
  o Product development stage; too early for evidence of any community, institutional, or country benefit (unlikely to be demonstrated during this project).
➢ Health benefits to individuals or the population
  ➢ Project still in progress. Considered product development, and therefore no health benefits expected to be demonstrated, although proposal speaks of "effectivity in the improvement of specific healthcare parameters".

Sustainability
Although not yet in place, sound consideration and plans have been provided to suggest the solution will be sustainable if it is found to be appropriate.

2. PAN *Project* Grants

Mongolia

Country Context
Mongolia is a landlocked country in a strategic location between China and Russia. An area of 1,564,116 sq km *[Canada = 9,984,670 sq km]* is occupied within 8,220 km of border (China 4,677 km, Russia 3,543 km). Terrain spans vast semi-desert and desert plains, grassy steppe, and mountains in the west and southwest, with the Gobi Desert in south-central Mongloia. The country experiences a desert or continental (large daily and seasonal temperature ranges) climate, with dust storms, grassland and forest fires, drought, and "zud" (harsh winter conditions). Mongolia faces several issues, including: limited natural fresh water resources in some areas; pollution (at one time severe) through burning of soft coal in power plants; deforestation; overgrazing; rapid conversion of virgin land to agricultural production promoting wind and rain-based soil erosion; and negative environmental impact from desertification and mining activities.

The Mongolian population is 2,951,786 *[Canada = 33,098,932]* (July 2007/6 estimates), with 28.7% being 0-14 years, 67.4% being 15-64 years, and 3.% aged 65 years and over, and the median age being 24.6 years *[Canada = 38.9]*. Infant mortality is 42.65 deaths/1,000 live births *[Canada = 4.69]*, and life expectancy at birth is 66.99 years *[Canada = 80.22]*. HIV / AIDS prevalence is less than 0.1%, with less than 500 people said to be living with AIDS / HIV and only 200 or fewer deaths per year *[Canada = 0.3%, 56,000, and 1,500, respectively]* (all 2003 estimates).

The predominant language is Khalkha Mongol (90%), with Turkic and Russian also spoken. Literacy (defined as those aged 15 and over that can read and write) is 97.8% with no gender disparity *[Canada = 99% with gender equality]*. The capital is Ulaanbataar, and there are 21 provinces (or aymags) and 1 municipality (or hot; Ulaanbataar). The labour force of Mongolia is about 1.577 million (2005 estimate), and they work in the agriculture (39.9%), industry (31.4%), and service (28.7%) sectors (2005 estimates). About 36.1% of the population live below the poverty line, and the Per Capita GDP is $ 2,100 USF *[Canada = $33,900 USF]* (2006/5 estimates).

About 156,000 fixed telephone lines exist in Mongolia (5.3%) *[Canada = 18.3 million; 55%]*, with 557,200 cell phones (18.9%) *[Canada = 16.6 million 50.2%]* (2005 estimates). The communications system in Mongolia has been assessed as 'improving', with international direct dialing available in many areas. The domestic system is supported through 7 satellite earth stations. There are about 272 Internet hosts *[Canada = 3,525,392]*, and 268,300 Internet users (9.1%) *[Canada = 21.9 million; 66.2%]* (2005/6 estimates).

Project IX   ICT's for Health Services in Rural Mongolia (# 101226)

Primary Key Informant Interviews were conducted with several individuals directly associated with the initiative on 28th August 2006 at the Health Sciences University of Mongolia in Ulaanbataar, and subsequently at the hospital and training centre in Saishand (south of Ulaanbataar near the Gobi Desert) on 29th and 30th August 2006. The primary Key Informant was Dr. Amir Amarsaikhan, but meetings were also arranged with the Minister of Health and Dean in Ulaanbataar, and administrators and residents in Saishand. In addition to the available IDRC reports, a document entitled 'Health Management Information System (HMIS) - Development Strategy. Ministry of Health, Mongolia. July 2005' was given to the investigator by the Minister of Health during a meeting. This document provided a high level understanding of Mongolia's intended strategic plans for 2006-2010 in regard to e-health (both health informatics and telehealth initiatives).

Commentary
This project intended to initiate a variety of e-health related activities, including establishing an applied research and development program at the University for distant clinical diagnosis and consultancy, and also a program in distance learning for rural medical doctors using Internet based applications. The objectives set for the study appeared to have been accomplished in principle, although evidence of routine clinical activity and e-learning use was lacking. Thus, the site visit to Saishand demonstrated the connection between the Health Sciences University of Mongolia in Ulaanbataar and Saishand's hospital and training centre, but frequency of functional connections was unclear. Enthusiasm shown was high for all partners, and there was a surprising quantity of technology available in Saishand whose use should be maximized.

Evidence of a formal and structured research or evaluation program was not evident, although from conversation it was clear that they were experimenting with different modes of delivery and application areas. Some course material was available.

- ➢ Knowledge production
  - o Beyond the IDRC reports there was little evidence of dissemination, other than through the website (http://www.infocon.mn/dd/) - which no longer appears to be functional.
- ➢ Research targeting, capacity building, and absorption
  - o No specific further e-health related activities had grown out of this particular project, but it seemed clear that the experience gained had encouraged the team to continue to explore further e-health opportunities.
- ➢ e-Health solution awareness, adoption, or integration
  - o Awareness of this project went beyond the team, across the University and to the national government. Although a plan was not shared, adoption and integration seemed certain.
- ➢ Informing policy or 'product development'
  - o The meetings arranged with the Minister of Health, Dean, and administrators demonstrated an ability to inform policy, and it was evident that the experience and opinion from the University was respected. No project related policy briefings or other documents were identified.
- ➢ Broader community, institutional, or country benefit
  - o From interviews with residents at Saishand, there was evidence of impact and user satisfaction at that site. Evidence-based demonstration of broader benefit was absent.
- ➢ Health benefits to individuals or the population
  - o Not at this time, although the potential is great.

Sustainability
There was every indication of the intent to adopt, integrate, and sustain both the clinical and the e-learning side of the projects activities.

Pakistan

Country Context
Refer to Appendix IV, Section 1. PAN *RnD* Grants, Pakistan

Project X   **"ICT for Rural Development in Mountainous and Remote Areas of Northern Pakistan (# 101054)"**

Primary Key Informant Interviews were conducted with three individuals directly associated with the initiative on 16-17 August 2006 at the COMSATS Headquarters in Islamabad, Pakistan. The individuals were: Dr. Hameed Ahmed Khan, Executive Director, COMSATS; Irfan Hayee, Senior Assistant Director, COMSATS; and Tajammul Hussain, Director, International Affairs, COMSATS. Additional contacts were provided through presentations from an e-health clinician from Skardu, and participation as an observer in a dermatology videoconsultation clinic. Beyond reports available from IDRC, a recent report was shared that had some relevance to the project – "Earthquake in Pakistan: An Assessment of Environmental Risks and Needs. 16th January 2006".

Commentary

Primary Key Informant Interviews were conducted with several individuals directly associated with the initiative on (date) at COMSATS Headquarters in Islamabad, Pakistan. Presentations were provided by the team lead and by a physician from Gilgit. This project would primarily be considered telehealth, as there was a minimal e-records component, although this was being developed (the Patient Information Management System, PIMS). PIMS will contain the history and examination forms and associated guidelines, which will help standardize process.

The area supported by the project, to the north-east of Pakistan (Gilgit and Skardu), is supported by limited air service and a circuitous road (often in poor condition); it is at about 7,000 feet, experiences extreme dryness, and communities suffer from hygiene issues. A lack of physicians (high turnover) predominates in Skardu. Similarly, a lack of skilled or trained technical resources exists. An alternative means was required to mobilize medical specialties. Some communities have LHW's (Local Health Workers), typically women, who have 10 years of schooling plus very basic training to promote family planning. Larger communities have some support through TBA's (Trained Birth Attendants) who have primary plus middle level education and receive about 3 months additional training. LHV's (Local Health Visitors), who travel to communities, have 10 years of schooling plus 2 years of training (however, there are too few, and the consistency and quality of training varies). It was noted that LHV's deserve more respect for the job they do under difficult circumstances. Beyond this are trained nurses and midwives; these are very few in number (less than 1,000; fewer than the number of doctors!) Practitioners throughout the healthcare system lack training, must consistently improvise, often learn by doing, and have inadequate time for CME / CPD since clinical demand constantly 'interferes'.

The project was initiated in January 2004. Both asynchronous technologies (taking pictures of skin lesions, storing them, and then forwarding later for review), and synchronous technologies (interactive videoconferencing) were utilised. To May 2006, about 1,100 patients have been provided with services. Local language is used in all transactions. A number of problems have been handled, including power failures, lost connections. Any cases requiring invasive procedures are immediately referred to face-to-face clinics. Telehealth services require a fee of about 500-1000 Rupees (about $5-10) which is a significant expense, but cheaper than long travel to major cities.

Dermatology was the application demonstrated during the site visit, but other specialties were being actively employed: cardiology, general medicine (including nephrology), and gastro-enterology. Other specialties were being considered. Patient acceptance was high, with some now asking to see the 'computer doctor'. Data (images, history, examination forms, guidelines) were stored in a 'Patient Information Management System'. In addition to dermatology, images included x-rays and ultrasounds.

COMSATS is a major ISP, and is considering increasing bandwidth availability (from 128 to 256 mbps), and providing Internet-based server capabilities which will enhance the service considerably. Project proposals are planned to expand the service, including development of web-portal. It is anticipated that COMSATS could handle provision of services to about 10 cities. One consideration is how to 'market' this service, without drastically harming the traditional service network, where suspicion of this interloping activity exists. The program has been presented to the local District Health Office and administration of the local District Hospital in Gilgit, who are now coming on board after a presentation to the Minister of Northern Regions. Some interest has been shown by clinicians in Lahore as a source of expertise.

Future activities are being considered, including extension of the current program to other towns, and introduction of a 'nurse-triage' telephone service (seeking funding for these two), development of a web-portal. The investigator suggested they consider use of smart phone or i-pod technology (with video capability) to introduce pod-casting to provide educational suppor.

➢ Knowledge production
  o Reports had been developed for IDRC. No journal articles were noted.
➢ Research targeting, capacity building, and absorption
  o The experience had led to exploration of further e-health opportunities. Funding is being sought for extension of the current telehealth project to other towns. Also, consideration is being given to introducing a service akin to a '1-800 Nurse Triage' line.
➢ e-Health solution awareness, adoption, or integration
  o Given the nature of the work undertaken by COMSATS, there is good awareness around e-health, and a desire to adopt such solutions. At this time e-health applications are too 'experimental' to be considered for integration.
➢ Informing policy or 'product development'
  o Although good linkages exist with government, there was little evidence of alignment with national needs, or of a clear national e-health policy.
  o The current telehealth service could be developed into a future product.
➢ Broader community, institutional, or country benefit (including social and economic benefit)
  o This telehealth project remains focused on one area, although there is the desire to expand to other communities. COMSATS has certainly gained valuable experience through performance of the project. Anecdotal examples were provided that demonstrated excellent value to patients. No country benefit exists at this time.
➢ Health benefits to individuals or the population.
  o No sound evaluation had been performed to demonstrate outcomes to patients. As structured, no benefits would be expected for the population or for the healthcare system.
  o However, observation during a dermatology clinic showed clear benefit to individual patients. In addition, anecdotal stories suggested benefit (e.g. a young boy suffering from eczema from head to toe was diagnosed by the dermatologist using telehealth, and within 2 weeks of treatment locally, was almost cured).

Sustainability
The current system depends upon volunteer physicians. Decreased donor funding had led to unpaid locums in some remote locations, which is causing difficulty.

Several thoughts were shared to encourage further development. It was suggested that a study should be conducted to determine what is the cost:benefit to patients and providers of the current telehealth service versus traditional services. In this way a 'market value' could be assessed, a key factor to determining sustainability. There was an expressed need for greater knowledge of health status, and it was suggested greater use could be made of m-health to facilitate exchange of information to and from remote health care providers. A similar need was expressed for enhanced education of healthcare providers currently in the field; for this it was suggested the use of i-Pods and pod-casts be considered.

Philippines

Country Context
Refer to Appendix IV, Section 1. PAN *RnD* Grants, Philippines

Project XI *Technology-Supported Distance Non-Formal Training and education in water, sanitation and hygiene (Philippines) (# 102248)*

Primary Key Informant Interviews were conducted with individuals directly associated with the initiative on 26th September 2006 at the offices of the Molave Development Foundation, Metro Manila, Philippines. This included Dr. Angelo Juan O Ramos, Executive Director. In addition to IDRC proposals and report documents, a series of CDs developed by this program were subsequently reviewed.

Commentary
This was perhaps one of the most evidently productive and well managed projects. Funding from IDRC supported the Water, Sanitation, and Hygiene (WASH) Manila Campaign. The project explored the potential of ICTs and distance non-formal education to achieve the mandate of WASH. A number of CD modules had been developed and were made available on-line. Impact was evaluated using focus groups, and although no significant differences in gender scores appeared, it was evident women were less comfortable with the use of computers, but recognised their potential for family improvement more than men. Although there was a research base to the assessment, a stronger methodology could have been used.

> - Knowledge production
>   - In principle good, although not (yet) distributed / promoted as widely as could be. This is planned, and should definitely be pursued as the product could have very good impact in many settings (schools / clinics / hospitals / general information).
> - Research targeting, capacity building, and absorption
>   - Although not necessarily based upon the IDRC project, this group is well established and organised and research targeting can be anticipated. Capacity building had occurred through learning more about on-line and inter-active module development.
> - e-Health solution awareness, adoption, or integration
>   - The products were recognized as valuable, and consideration was being given to how best to promote adoption and integration of their use into different settings.
> - Informing policy or 'product development'
>   - Discussions with local decision- and policy-makers had taken place, but impact was not yet evident.
> - Broader community, institutional, or country benefit
>   - At this time limited, but good potential.
> - Health benefits to individuals or the population
>   - No outcomes-based evidence but anecdotal evidence available.

Appendix V - National Health Needs of Selected Countries

In developing countries, there exists greater inequity of access to basic health services resulting in some regions and communities being devoid of the most basic level of care. A considerable number of preventable diseases and premature deaths still prevails. In most of these countries, the health sector is underfinanced which has led to deficiencies in service delivery and growing gaps in facility and equipment upkeep. Inefficient allocation of the limited resources and lack of coordination between health sectors, institutions, and stakeholders are common problems. The situation of technology adoption within developing countries has also seen growing polarization with segments of the population being 'side-stepped' by the products of the information revolution. The resulting digital divide creates a `development divide' which includes insufficient telecommunications infrastructure, high tariffs, inappropriate or weak policies, organizational inefficiency, and uneven ability to derive economic and social benefits from information-intensive activities.

In the recent past, health reform processes have been initiated in many developing countries with each moving at a different pace within the context of its own particular health system model. There are, however, common trends that characterize most health sector reform processes:
- the generalization of a high cost-benefit package of basic health services
- a set of standardized public health interventions
- cost containment and recovery
- administrative decentralization and operation of healthcare services
- recognition of the role of the private sub sector and the inter-sectoral nature of health interventions
- health models oriented towards primary care and centered on people
- focus on quality and accountability
- moving away from the reactive delivery of care to a more proactive management approach of the health status of individuals and population groups

The following is a listing of some South Asian and South-East Asian countries that are undergoing health system reform and could be possible contenders in the development of a regional 'Health and ICT' research network.

South Asian Countries	South-East Asian Countries
Afghanistan	Cambodia
Bangladesh	Hongkong
Bhutan	Indonesia
India	Lao PDR
Nepal	Mongolia
Pakistan	Papa New Guinea
Sri Lanka	Thailand
	Vietnam
	Philippines
	[Singapore]
	[Malaysia]

Some Country Programs and Strategies Relevant to e-Health

Bangladesh	Integrated Rural Health Information System (IRHIS), a private sector initiative and first national e-Health project.
Bhutan	Royal Government of Bhutan White Paper: Information and Communications Technology (ICT) for Bhutan (2003). The ICT 2007 vision encompasses e-health.
India	Framework for Information Technology Infrastructure for Health which defines standards for telemedicine systems (Department of Information Technology, Ministry of Communication and Information Technology). Some e-government initiatives exist - electronic medical records in West Bengal, as do Telemedicine initiatives (supported by the Indian Space Research Organization; ISRO) with over 100 telemedicine centers in the country. Telemedicine facilities have been implemented in all district hospitals in Chhattisgarh, Jharkhand, Karnataka, and Kerala.
Hong Kong	Hong Kong health information infrastructure (2007); the Hong Kong Hospital Authority initiative.
Philippines	Health information portal from the Philippine Council for Health Research and Development.
Singapore	Development of a national healthcare infrastructure - part of Intelligent Nation 2015 (iN2015), "Singapore's 10-year master plan to help ... realize the potential of infocomm". A major healthcare planning report (Integrating Healthcare, Empowering Patients), has been produced by the Singapore Infocomm Development Authority in close consultation with the Ministry of Health.
Thailand	Ministry of Public Health has plans for a national healthcare infrastructure incorporating e-referrals, teleconsultations, telemedicine, electronic personal health care records, and electronic health cards.

Country Health Profiles:

Much of the information provided below was extracted and summarised from Country Health Profiles prepared and made available by the World Health Organisation (WHO Regional office for SE Asia, Country health profiles; www.whosea.org). Additional resources used for identifying the national needs of selected Asian countries were:

- National Health Policy Government of India Ministry of Health & Family Welfare New Delhi 1983 (www.mohfw.nic.in)
- Open Clinical, Knowledge management for clinical care, National Health IT programmes, Asia-Pacific, http://www.openclinical.org/nationalHITprogrammesAsiaPacific.html
- 1994 Electronic Newsletter on Population, Health and Nutrition Issues, Population, Health and Nutrition (PHN) Department, World Bank, Malaysia health development.
- Health Situation; www.wpro.who.int/countries/05phl/national_health_priorities
- Mongolian Embassy; www.mongolianembassy.us
- Kingdom of Cambodia, Ministry of Health, Health Sector Strategic Plan (2003-2007) , Summary, August 2002
- Health situation in the western pacific region, Health sector development division WHO/WPRO, Manila; http://www.searo.who.int/ehp/tag/material/HCF-TAG%20meeting%2017-19%20Feb%2003,%20Manila/INF1a.ppt#256,1,Health Situation in the Western Pacific Region
- Cambodia demographic and health survey 2005, preliminary report, ; http://www.foodsecurity.gov.kh/otherdocs/CDHS-preliminary-report.pdf#search=%22cambodia%20health%20and%20demographic%20situation%22
- Towards a Global e-Health Framework for the Support of Pandemic Control, Steve Hinske, ETH Zurich and Pradeep Ray, UNSW Australia, Med-e-Tel 2006, Luxembourg, April 2006.
- National Health Policy, 2001, Ministry of Health, Government of Pakistan, http://lnweb18.worldbank.org/sar/sa.nsf/Attachments/Pak-NHP/$File/Pak-NHP.pdf
- USAID- Asia and Near East- Countries- Pakistan; www.usaid.gov/cgi-bin/keyword.cgi?keyword=Pakistan
- Vietnam's Health Care System: A Macroeconomic Perspective Paper Prepared for the International Symposium on Health Care Systems in Asia, Susan J. Adams, Ph.D., Senior Resident Representative, International Monetary Fund
- From Socialism to Private Markets: Vietnam's Health in Rapid Transition; Lincoln C. Chen, Linda G. Hiebert, 1994
- Singapore Ministry of Health website; www.moh.gov.sg
- Ministry of Public Health, Afghanistan National Health Policy 2005-2009 & national health strategy 2005-2006, A policy and strategy to accelerate implementation

INDIA

The health sector in India is characterized by: (i) a government sector that provides curative and preventive health services throughout the country (from primary to tertiary level) free of cost to the consumer, and (ii) a fee-levying private sector that dominates the provision of individual curative care through ambulatory services.

A successive Five Year Plan (FYP) provides the framework within which States may develop their health services infrastructure, facilities for medical education, research, etc.. Central legislation enacts laws for standards of medical education, prevention of food adulteration, maintenance of standards in the manufacture, and sale of certified drugs, etc.

Health Trends

Despite India's commitment to HFA (Health For All), enormous health problems still need to be addressed. While overall mortality has declined considerably, living standards are still among the poorest in the world. The major constraints facing the health sector are lack of resources, lack of an integrated multi-sectoral approach, poor involvement of NGOs, inadequate laboratory services, a manually operated health management information system (HMIS; although this is rapidly changing), poor disease surveillance and response systems, and the heavy investments needed in dealing with non-communicable diseases. There has been an increase in mortality through 'Western' life-style diseases such as diabetes, cancer and cardiovascular diseases. The increase in life expectancy has increased the requirement for geriatric care. Similarly, the increasing burden of trauma cases is also a significant public health problem. The changing economic situation created by urbanization, industrialization and economic liberalization has resulted in the creation of several social problems for individuals and groups such as older persons, the disabled, drug addicts, street children, child labor, HIV-infected populations, etc. Overpopulation in some areas compounds the situation. The problem of protein-energy malnutrition (PEM) and micronutrient deficiency disorders remain significant and are being dealt with through a number of national programs with well defined goals. Diarrhoeal diseases, are still a major cause of morbidity and mortality in infants and children. Malaria, filariasis, visceral leishmaniasis, Dengue, etc. are some of the endemic diseases that have been prevalent in India with periodic outbreaks. Of the non-communicable diseases, cancer and cardiovascular diseases are major health concerns that will require considerable financial resources for case management.

The government has taken action to promote healthy lifestyles through sports, health education, setting up of no smoking zones, legislation banning smoking in public places, and establishing drug detoxification centers. Efforts to improve environmental health are underway. Various international organizations and UN agencies such as WHO, World Bank, UNICEF, UNFPA, USAID, Japanese Assistance, ODA (UK), SIDA, NORAD, DANIDA have continued to provide significant technical and material assistance which has had a positive impact. In 2002, the government undertook steps to formulate a new National Health Policy framework.

Health system

Goals and strategies for the public sector in healthcare are established by the Central Council for Health and Family Welfare through a process involving all levels of government. The National Health Policy-2002 (NHP) introduced a fully integrated planning framework to provide comprehensive primary health care services, relevant to the actual needs and priorities of the community and at a cost which the people can afford. It ensures that the planning and implementation of the various health programs is through organized participation of the community, adequately utilizing the services rendered by private voluntary organizations active in the Health sector. In the establishment of the reorganized services, priority is accorded to vulnerable sections of the society and endemic disease affected populations.

State health systems/projects have been formulated to improve efficiency in the allocation and use of health resources. Specific efforts have been made to consolidate and strengthen the PHC (Primary Health Care) infrastructure, under the minimum needs program, by providing enhanced assistance to regions with severe health problems, supporting voluntary organizations, improving IEC (Information, Education and Communication) activities, etc.. In order to meet current needs and emerging challenges, inter-sectoral coordination of the various efforts in the fields of health and family planning, medical education and research, drugs and pharmaceutical, education and social welfare, and rural development were constituted. The restructuring of the existing health system included a referral system to provide adequate expertise at the various levels of the organizational set-up nearest to the community. Programs have been devised to encourage the establishment of practice by private medical professional, increased investment by non-governmental agencies in establishing curative centers and by offering organized logistical, financial and technical support to voluntary agencies active in the health field. The process has been initiated for decentralization of authority to the various levels to enable decision making at the right time. In pursuit of the national health policy for the establishment of an efficient and effective management information system, a computer-compatible health management information system has been designed and implemented.

National Health needs and priorities
The 10th FYP (2002-2007) had as its main health related objectives:
- Reduction of the poverty ratio by 5 percentage points by 2007;
- Providing gainful and high-quality employment at least to the addition to the labour force;
- All children in school by 2003; all children to complete 5 years of schooling by 2007;
- Increase in Literacy Rates to 75 per cent within the Tenth Plan period (2002-3 to 2006-7);
- Reduction of Infant mortality rate (IMR) to 45 per 1000 live births by 2007 and to 28 by 2012;
- Reduction of Maternal Mortality Ratio (MMR) to 2 per 1000 live births by 2007 and to 1 by 2012;
- All villages to have sustained access to potable drinking water within the Plan period;
- Cleaning of all major polluted rivers by 2007 and other notified stretches by 2012;

On the whole, the health care delivery system has expanded, but issues such as consolidation of existing infrastructure and quality need to be given more attention.

With the recently implemented FYP (2007-2012), the health related future goals are:
- Creation of seven core job opportunities;
- Reduce educated unemployed youth to below 5 percent
- Infant mortality rates to be reduced to 28 per 1000 births;
- Maternal death rates to be reduced to 1 per 1000 births;
- Clean drinking to all by 2009;
- Improve the sex ratio to 935 by 2011-12 and to 950 by 2016-17;
- Ensure electricity connection to all villages and *broadband over powerlines (BPL) to all households by 2009*
- Achieve the World Health Organization standard air quality in major cities by 2011-12;
- Treat all urban wastewater by 2011-12 to clean river waters.

BANGLADESH
Since independence, the Government of Bangladesh has invested substantially in the institutionalization and strengthening of health and family planning services, with special attention to rural areas and is committed to the HFA goals and the PHC approach. Significant

progress in improved health indicators has been made in recent years, mainly due to Government commitment supported by donors in providing preventive care with respect to child health and family planning. Despite this, serious problems remain related to both access and quality of curative care that hurt the poor most. Infrastructure for service delivery at local level does exist in rural areas, but they function inefficiently.

Many health sector reforms (including decentralization) have been planned in the context of a changing health situation in the country. Health sector development is considered to be an integral part of overall socioeconomic development. The main constraints are the shortage of trained manpower, limited funds, poor community awareness, and a weak information system. Changes in Government (and associated changes in plans) have derailed or delayed efforts at establishing country-wide clinics and other initiatives.

Health trends
The life expectancy at birth for both sexes has increased, and infant mortality has dropped to 51 per 1,000 live births from three times that number in the mid-1970s. This has been in part due to the successful implementation of the immunization program as well as disease control programs such as those for ARI and diarrhoeal disease. Despite this, infant and maternal mortality rates remain high. Morbidity in Bangladesh is mainly due to infectious, parasitic and vector-borne diseases. The proportion of fully immunized children has increased, and the total fertility rate has reduced as the contraception prevalence rate (CPR) has increased. Substantial progress has been made in disease prevention and control, and childhood communicable diseases have declined, but new and old infectious diseases (malaria, tuberculosis, AIDS) remain important threats.

Nutritional disorders are rampant as the quality of life of the general population is still very low. Malnutrition still remains a problem both in urban and rural areas. With NGO collaboration, a major nutrition project is currently being implemented. Some constraints faced at improving nutrition are inadequate food supplies including micronutrients, economic and sociocultural factors, and the prevalence of diseases. Communicable and poverty-related diseases that are preventable still dominate the top ten causes of morbidity. Of the non-communicable diseases, cancer and cardiovascular diseases are the leading causes of morbidity and mortality.

The government now gives priority to cost sharing, decentralization of authority, decision making and program implementation at the peripheral level, promotion of community participation, delivery of a package of essential services to the poor, and mobilization of financial resources by negotiating with donors such as the World Bank. Changes in human resources for health include production and deployment of more health and health-related personnel, refresher training for health personnel in service, and greater use of health volunteers. Over the period, the investments (public and private) in essential drugs, vaccines and ORS have increased. The government also launched an education program for providers and users on the rational use of drugs.

WHO and SAARC are major players in gradually building up the national capacity through regional collaboration. Partnership arrangements for health have been established with bilateral agencies, with funds usually channeled through nongovernmental organizations.

Health System
There is awareness that decentralized health management systems are an important part of health sector reform, but evidence suggests this has not worked as desired[28]. Privatization of medical

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[28] Ahmad A, Bose M, Persson TH. Decentralized Provision of Primary Healthcare in Rural Bangladesh – a Study of Government Facilities. Lund University, Department of Economics. Working Paper, # 2007:11, 18 June 2007. Available from: http://ideas.repec.org/s/hhs/lunewp.html. Last checked 25 June 2007.

care at the tertiary level, on a selective basis, is also being introduced. Inter-sectoral committees at the different levels from the national level to the periphery are formed whenever the need for cooperation exists. A new approach to program implementation has been tried out with WHO assistance. Strengthening of the HMIS through training, use of data collection tools already designed, and the establishment of information networks with computer support are being explored. The roles of the individual, family and community are emphasized in the intensified action program for PHC implementation. The information department and mass media inputs are also utilized to support IEC activities. Three organizations [the Bangladesh Medical Research Council (BMRC), the Institute for Cholera and Diarrhoea Disease Research, Bangladesh (ICDDRB), and Essential National Health Research (ENHK)] spearhead biomedical and operational research. Health training institutions have yet to include Health Systems Research in their curricula. Emphasis has been given in recent years to school health education, hospital health education and coordination with NGOs. Constraints include the lack of a national IEC strategy, the low priority given to health education by the health services, underutilization of health education officers, and lack of opportunities for professional advancement of those working in health education. A number of project activities have been initiated for providing comprehensive maternal and child health and family planning. Immunization services have been successfully extended to village level.

The government of Bangladesh has been encouraging more private investment in the health sector and has taken steps to attract more foreign investment in medical and hospital services. There is interest in introducing western standards and practices into the healthcare system, and as a result of deregulation of the market Thai, Singaporean, British and other entities have entered into the Bangladesh healthcare market.

National health plans and priorities
The Health and Population Sector Programme (HPSP), a five year sector-wide program of the Ministry of Health and Family Welfare, ran from 1998 to 2003 (supported by a consortium of donors, led by the World Bank). The HPSP incorporated the following key principles**:** greater orientation to client needs, especially those of the rural population and women; improved quality, efficiency and equity of government health services; provision of a package of essential health services; expanded private sector role in providing health and population services; and expanded cost recovery and improved efficiency of resources by the public sector. More recently, the Health, Nutrition, and Population Sector Programme (HNPSP) was initiated in 2004. This focuses on vulnerable populations, including the elderly, and emphasizes reducing malnutrition, mortality, and fertility, promoting healthy life styles, and reducing risk factors to human health from environmental, economic, and social and behavioural causes.

New policies on public-sector/private-sector mix and financing of services will be developed. Health insurance coverage in urban Bangladesh is proposed to be increased through development of a health insurance scheme for government employees and for employees of state-owned enterprises. Existing policies are being reviewed and revised for improving accessibility, affordability and quality of services and for further improvements.

Last year (2006) Bangladesh and the World Bank signed a multi-donor deal (development partners from Britain, Sweden, Netherlands, Germany, European Commission, UN) to funnel $460 million into the country's health sector. The focus is on the existing HNPSP and support is provided through a trust fund administered by the World Bank. The HNPSP continues to help modernise Bangladesh's health sector and speed up progress towards reaching health-related millennium development goals (MDGs). Overall it is supported by about $4.3 billion in government and donor funding for 2003-10.

BHUTAN

Bhutan, still classified as a least developed country, has made significant strides after adopting the primary health care approach in 1978. Very few Bhutanese suffer from extreme poverty and income distribution is relatively even, but the remoteness of many villages makes provision of goods and basic social services difficult and costly. An effective health care system is in place that provides access to 90% of the population. Financial allocations for the health sector have been high in the recent years. But the country is not without constraints that hamper improvement of existing health services. The country is landlocked, subject to trade sanctions, has a rugged topography that is responsible for inadequate road network, harsh climate, has telecommunications difficulties and limitations in qualified, skilled manpower, which cuts across all sectors.

Health trends

Life expectancy has increased considerably. This increase is attributable to improvement in maternal and child health, immunization, nutrition, water supply and sanitation, control of communicable diseases and higher literacy rates. Though the drop in infant and maternal mortality is significant, mortality still remains very high. The five leading diseases reported are acute respiratory infections, dysentery, skin diseases, conjunctivitis and parasitic infections. Malaria and tuberculosis remain major problems and the lack of a sensitive reporting system makes situational analysis difficult. Non-communicable disease concerns such as hypertension, neoplastic diseases and trauma, especially road traffic accidents, are emerging problems. Morbidity and mortality due to communicable diseases, especially the vaccine-preventable diseases of childhood, have declined considerably. There has been notable improvement in control of iodine deficiency disorders (IDDs), but protein-energy malnutrition (PEM) and iron deficiency anemia are still problems.

Bhutan's approach to health care has been the delivery of an integrated health service package to its population scattered across a difficult mountainous terrain. The Royal Government accords the highest priority to human resources investment, both in quality and development. Sustainability is recognized as a key consideration in all national development strategies and policies, achieved through meaningful community participation in development activities. The 8th FYP (1997-2002), based on HFA goals and priorities, was formulated to include intensification of population activities, coverage of un-reached population groups, disease control, reproductive health, mental health and environmental health. Community action and participation has been very effective and will continue to be promoted. Provisions were made for water and sanitation - both maintenance and new facilities, though there are no established water quality standards. The development of the health service infrastructure has been considerable.

The health sector has received aid from WHO, other UN agencies, bilateral agencies and NGOs. Recently, DANIDA emerged as the single largest agency involved in health.

Health System

The Ministry of Planning is the coordinating agency among the various sectors at a central level. Decentralisation exists, where District administrations facilitate inter-sectoral cooperation at that level, while individual sectors have a free hand to establish direct coordinating mechanisms.

The 8th FYP strived to intensify population activities; consolidate and strengthen existing health infrastructure; promote self-reliance and sustainability of the health sector by studying cost sharing practices, instituting trust funds and involving the private sector in a controlled manner in chosen areas; strengthen human resource development according to a master plan and upgrade training institutes; enhance the quality of health services; extend health care services to those in

unreached areas; and strengthen the health management information system. The 9th FYP (2002-2007) put emphasis on infrastructure development and improvement in the quality of social services.

The national policy is one of decentralization to the district level. Health care is provided through a four-tiered network of outreach clinics, BHUs, district hospitals and regional hospitals with the national referral hospital at the apex assuring access to services with uniform levels of care. There has been an effective implementation of the managerial processes for health. The conventional health management information system (HMIS), with assistance from DANIDA and WHO, has been reoriented to receive data from diverse sources and guide the system towards use of information for decision making at all levels. Substantial financial allocation has been earmarked for development of research capacity within the Health Division. Future strategies will also include collaboration with research institutes in other countries. The IEC for Health Bureau provides health education and health promotional support to all health programs. The 8th FYP visualized a strategy to focus on reproductive health care with all its respective service components. Village health workers are involved in motivating and bringing women and children to clinics for MCH/FP services. National immunization days have been conducted since 1995 and the program has made a dramatic impact on the vaccine preventable diseases of childhood. Newer disease control strategies have been introduced with regard to the major communicable diseases. Programs for community-based rehabilitation and mental health were launched in 1996. Most disease programs are gradually being integrated into general health services. For prevention and control of locally endemic diseases, a reliable health information system and operational research are important.

National health plans and priorities
'Bhutan 2020: A Vision for Peace, Prosperity and Happiness' was introduced in May 1999. While not specifically health focused, the overall objective is poverty reduction through the promotion of sustainable growth with special attention given to the environment. Specific objectives for the future are intensification of population activities for smaller but well provided for and happier families, consolidation and strengthening of existing health infrastructure for equitable and standardized health services, promotion of self-reliance and sustainability, strengthening human resource development, enhancing quality health care services, and extending health care services to unreached areas.

The health management information system (HMIS) will need to receive priority consideration and health systems research promoted and used for decision making. Intensification of family planning services and disease prevention and control programs are needed, as is prevention of cancer and cardiovascular diseases through health education. The high immunization coverage must be maintained and nutrition standards strengthened to improve maternal health and reduce maternal and infant mortality. Human resources development could also incorporate external training programs.

Achieving the ultimate health will depend much on external assistance and active coordination with and cooperation of other relevant sectors. Action to ensure sustainability including financial affordability and related policies has been initiated.

INDONESIA
In 1992 a health law was passed which defined the role of government in health for the next decade and laid the groundwork for other health regulations. This law also mandated employers with more than ten employees to provide them with some sort of health benefits. A number of innovations have been introduced in many areas, such as in manpower planning, nutrition,

immunization, water supply, generic drugs, health care financing and district health management. The government of Indonesia emphasizes the development of human resources also assigning priority to improving health and education. Control on matters of policy and technical guidance is retained by the Ministry of Health while the provincial health office has operational responsibility.

Health trends

The increase in the life expectancy at birth has warranted increased health expenditure. Mortality rates have shown a gradual but slow decline. The highest life expectancy rate is in Special Region of Yogyakarta (72.17y), followed by Special Region of the Capital City of Jakarta (72.12y) and the shortest is West Nusa Tenggara (63.51y). The persistence of many of the communicable diseases, and the re-emergence of others, are of concern. Malaria control activities have had a minimal effect on the incidence of the disease. The prevalence of tuberculosis also appears to be rising due to limited coverage of the intervention program, high treatment dropout rates, and multi-drug resistance. The increase in non-communicable diseases is another important issue. Nutritional concerns of importance are PEM and micronutrient deficiencies, particularly iron deficiency anemia, IDD, and vitamin A deficiency. The prevailing environmental problems (due to industrialization) have also resulted in health concerns.

Health system

Indonesia describes its National Health System, or Sistem Kesehatan Nasional (SKN), as an arrangement with integration and mutual support that coordinates various efforts of the Indonesian nation to ensure the highest health status as a realization of the general welfare mentioned in the preamble of the 1945 Constitution. As a result, local governments are granted the authority and responsibility to provide primary health care and referral services. At the next level, health centers and hospitals provide services, and at the tertiary level are the larger hospitals and other specialized health institutions.

A comprehensive approach to promote health status and improve life expectancy has been initiated using the family as the focal point. With regard to health human resources, a policy of zero personnel growth to optimize efficiency has been adopted in the public sector limiting its capacity to open new facilities and provide more services. This in turn has caused a shift of health professionals, particularly of doctors, to the private sector. Alternative mechanisms of funding health services such as community health maintenance insurance schemes, user fees to support operational activities of hospitals, and privatization for provision of secondary and tertiary levels of health care are being implemented. Private facilities are required to provide subsidized services to the poor.

The government continues to strengthen decentralized management, particularly at district and municipal levels. Essential drugs to the public sector are subsidized by the government and the price of drugs for use at PHC level is also controlled. Since the fourth plan, 20-30% of public health expenditure has been borne by foreign aid. The role of NGOs such as the Lions Club, Rotary, etc. is considerable in health programs. There have been joint efforts of different sectors in implementing the global strategy on AIDS, the polio immunization campaign, rural water supply and sanitation, etc. Health information has been strengthened by developing a simplified health centre recording and reporting system to ensure the completeness and accuracy of data, as well as an improved, integrated surveillance system. National, regional and district health profiles have been developed. Advanced computer technology, which offers almost unlimited opportunities for improvement of the information system, is also being introduced. There has been an increasing trend in community, NGO and private sector participation in health development. The National Institute of Health Research and Development (NIHRD) provides guidance for research and development activities within the scope of the MOH.

Health law makes a clear reference to health education and promotion (HEP). HEP has focused on certain priority health programs, namely MCH, nutrition, environmental health, changing lifestyles, and health financing. The immunization program is sustainable and is well supported by volunteer health workers. Improvised programs for management of communicable diseases have been established. Efforts are underway to strengthen early case detection capabilities of cancer. For cardiovascular diseases, the plan is for early detection and improved facilities for treatment, together with increasing the level of awareness in the community. Introducing the concept of 'proactive' hospitals is also planned.

Efforts have been made to reallocate some of the subsidies for public hospitals to support primary health care services, particularly for the underserved, by means of converting public hospitals into self-supporting service units (Swadana). The 'health card' program was also introduced to improve the access of the poor to health care services. The public has been encouraged to join the "voluntary managed care plan" (JPKM) for better health protection and access to services.

National health plans and priorities
To achieve the goal of optimal health, services will have to be of adequate quality and accessible to all. More decentralized health administration, particularly at the district level is planned. The Ministry of Health's organizational structure has been restructured to provide greater technical support, effective program review, policy analysis, and better resource mobilization for health, and to create an environment which favors healthy lifestyles. In the area of health services, attention needs to be paid to the quality of services provided, particularly in public health facilities. The increasing role of the private sector in health requires more effective regulatory mechanisms. Strategies for infant and maternal mortality reduction emphasize inter-sectoral cooperation, community participation, and delegation of authority to provincial and lower levels. A framework for future strategies is proposed under five main areas: ensuring equity for health, strengthening health promotion and protection, strengthening the health sector, developing and strengthening specific health programs, and strengthening international partnerships in health.
Indonesia is the largest archipelago in the world. With an estimated 17,508 islands, of which about 6,000 are inhabited, the country could benefit significantly from implementation of e-health initiatives.

NEPAL

A National Health Policy (NHP) in Nepal was formulated in 1991 which served as a comprehensive policy to address service delivery as well as the administrative structure of the health system. Subsequently, the 9th Health Plan (1997-2002) and Second Long Term Health Plan (SLTHP) (1997-2017) were developed in keeping with the NHP. Realisation of the need for a holistic package of health sector reform resulted in reconstitution of the Nepal Health Sector Reform Committee (NHSRC) and the "Nepal Health Sector Program – Implementation Plan (NHSP-IP)[29]" in 2004. This document guided strategies to achieve the health component of the Millennium Development Goals as set out in Nepal's Poverty Reduction Strategy Paper, 10th Five Year Plan, and its fiscal framework. The 10th Five Year Health Plan (2002-2007), focused on policy objectives like (a) Making essential health care services (EHCS) available to all people, (b) Establishing decentralized health system to encourage peoples' participation, (c) Establishing Public-private –NGO partnership in the delivery of health care services, and (c) Improving the quality of health care through total quality management of human, financial and physical resources, which has been well packaged in this document. More specifically, the strategy will

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[29] Nepal Health Sector Program – Implementation Plan (NHSP-IP). His Majesty's Government, Ministry of Health. October 2004. Available at: http://www.moh.gov.np/new/NHSP_IP.pdf. Last checked: 25 June 2007.

prioritised EHCS (Essential Health Care Services), decentralised health management, private and NGO sector development, improved sector management, better financing and resource allocation, enhanced management of physical assets, better Human Resource development, and introduction of integrated Management Information Systems and QA Policy.

Health trends
Frequent changes of government, limited national resources for health services development, centralized administration, ineffective management and supervision, difficult geographic conditions and slow economic growth have been the main restraints to better organization of the health system.

There have been some improvements in the MCH/FP indicators in Nepal. Five leading causes of mortality have been reported as Pneumonia, other cardio-pulmonary diseases, encephalitis/meningitis, septicemia and diarrhoea. Malaria and TB remain the important communicable diseases, with HIV/AIDS substantially contributing to this burden in recent years. Major progress has been achieved towards the elimination of leprosy. The life expectancy at birth has increased with the reduction in infant mortality rate (IMR) being a major contributory factor. Lack of data does not allow a realistic assessment of either mortality or morbidity. Nepal continues to experience imbalances in the health workforce due to shortages of personnel and geographical maldistribution. This is accompanied by poor physical health infrastructure and maintenance.

Health system
The district health systems support government/private sector partnerships for health financing and cost sharing/recovery schemes in collaboration with international and local NGOs and other donor partners. In developing policies, strategies and plans, there is a process of broad consultation that involves the principal stakeholders from the community, the government, the private sector, international and local NGOs.

The main features of the health plan are the development of integrated and essential health care services at the district level and below, expansion of the primary healthcare network, mobilization of the private sector to provide general and specialized health services, ensuring quality assurance in health care, making MCH/FP an integral part of PHC services, inter and intra-sectoral coordination, decentralization of health administration, developing the traditional system of medicine, active community participation, and partaking of national and international NGOs, private enterprises and foreign investors. A master plan for the development of human resources for health has been finalized. There has been an increasing trend in the allocation of financial resources for health sector development. The efforts of the government for strengthening the infrastructure are supported by the external development partners with additional aid from the local communities.

With more than 49,000 village based Female Community Health Volunteers, Nepal's basic health infrastructure is linked all the way to the villages. Immunization programs and other related activities have been successfully carried out with the broad involvement of the communities. There has been significant improvement in the diagnosis, referral and treatment of common diseases and nutritional problems. The main health program areas for intersectoral cooperation are HIV/AIDS and STD control, Safe Motherhood, IEC (Information, Education, and Communication) for health, Health Management Information System (HMIS), Nutrition, and the National Immunization Program. The influence of community action has been reflected in rural areas through the involvement of health volunteers and an upsurge of NGO participation.

For improving organizational and management aspects of health services delivery, an integrated HMIS, a human resources development information system and a logistics management information system (LMIS) have been established within the DOH. The HMIS, applicable nationwide, has made it possible to produce a complete integrated annual district health system (DHS) report.

The Nepal Health Research Council is the main body for planning and coordinating research activities related to bio-medical and operational research. Its activities are complemented by the research programs of the institutions of medical education and selected NGOs specializing in research, the WHO and other development partners. Health information and education of the public is being implemented in collaboration with NGOs and media. The establishment of a National Health Education, Information and Communication Center (NHEICC) under the Department of Health was a milestone in efforts at health promotion. This centre backs up important health programs and also streamlines IEC activities after vertical programs are integrated into general health services.

The main international partners for health are WHO, UNICEF, UNDP, UNFPA, World Bank, GTZ, DFID, USAID, JICA, SDC. The funding support through international partnerships has contributed much to the expansion of health facilities throughout the country.

National health needs and priorities
Assistance from international donor agencies still continues to play an important role in the provision of health care. The future vision is to provide equitable access to quality health care services in both rural and urban areas. To achieve equity, access to health will need to be provided to vulnerable groups such as women and children, the rural and urban poor, the underprivileged, and marginalized population groups. To meet the main health problems of the people, the government will give priority to health promotion and prevention and to the development and implementation of a set of "Essential Health Care Services" (a priority package of public health measures and essential clinical services including traditional and other systems of medicine) that will be available to the entire population. Central to this vision of health and development is the recognition of self-reliance, gender sensitivity in health programs, full community participation, private sector participation (public/private mix), and decentralization as characteristics essential to the health system. The proposed strategies of the government will be:
   (1) ensuring equity for health,
   (2) strengthening health promotion and protection,
   (3) strengthening the health sector including partnerships in health development,
   (4) developing and strengthening specific health programs,
   (5) developing and using appropriate health technologies, and
   (6) strengthening international partnerships.

SRI LANKA

Sri Lankan policy has always regarded education and health as crucial to socioeconomic development, the overall principle being to promote both equity and efficiency of services. During the mid 1990s a Presidential Task Force was constituted to develop a strategic framework for implementation of the national health policy, which retains current policies and prepares to meet new challenges.

Health Trends
Sri Lanka has witnessed outstanding success in overall health status. The population growth rate continues to decline. There has been a declining trend in mortality in Sri Lanka accompanied by

an increase in the life expectancy at birth. Remarkable achievements have been made in the reduction of mortality in respect of the EPI-target diseases. All other communicable diseases have also shown a decline, but non-communicable diseases have shown a two-fold increase during the past two decades. The increasing prevalence of HIV/AIDS is a new health challenge. The nutritional status of children has not significantly improved over the years reflected by persistent disorders. Improvements in communication and a shift towards urbanization and industrialization have resulted in more injuries and trauma. There is an increasing awareness of lifestyle-related health problems associated with alcohol and tobacco use, substance abuse, diseases of affluence and nutrition, and sedentary lifestyles. The paucity of financial resources for improving physical infrastructure is another major constraint.

Health system
In the health sector, the management of all health care institutions (other than teaching hospitals and special hospitals) and public health services is the responsibility of provincial councils and the respective provincial health ministry. The Ministry of Health is responsible for developing health policy, enforcement of health legislation, mobilization of resources, inter-sectoral and international coordination, etc. At the provincial level, mechanisms for policy planning, coordination, and development are in place.

The broad aim of the health policy of Sri Lanka is to improve health status and thereby quality of life by controlling preventable diseases and by health promotion activities and reducing inequalities. The National Health Development Master Plan developed by the Ministry of Health adopts the slogan "Healthy & Shining Island in the 21st Century". Its objectives include comprehensive health services delivery, improve the management of human resources for health, empower community participation, strengthen management functions, improve health finance allocation and utilization.

The health policy in Sri Lanka clearly identifies inter-sectoral action for health as an important element in the health development process. Healthcare has been integrated with rural development projects. Financial resources for healthcare are mainly from the government. Service provision in the public sector is mostly free of cost to the consumer. The private sector contribution has been comparatively small in terms of service provision and financing, but has been growing, mainly in urban areas. A plan for human resources in health is currently under preparation. There is a comprehensive network of health centers, hospitals and other medical institutions located countrywide. A Health Information System (HIS) is in place consisting of management information data (resources available and service data) and epidemiological information, including routine surveillance data for communicable diseases. A system to routinely monitor trends in non-communicable diseases and their risk factors has still to be established. The MCH/FP program has been expanded to take on the broader concept of reproductive health. High immunization coverage against the six diseases under the expanded program on immunization (EPI) has been achieved and maintained even in very remote areas. Strategies for prevention and control of locally endemic diseases include immunization against the vaccine-preventable diseases, enhanced disease surveillance and control actions, training of medical officers and public health staff, a computerized database at central level, and environmental interventions and vector control activities. Improved case management practices are being administered for common diseases.

The National Institute of Health Sciences is the focal point for health services research. Steps are underway to establish a National Health Research Council with wide-ranging terms of reference. The Health Education Bureau (HEB) at central level is responsible for education and training, dissemination of health related information, advocacy for health, social mobilization, and production and dissemination of IEC materials.

The major partners for international aid are UN agencies, development banks and bilateral agencies.

National health plans and priorities
The future health scenario in Sri Lanka desired by the year 2020 encompasses improvement in health status indicators, disease elimination / eradication, mortality reduction (mainly communicable diseases), disease containment (mainly non-communicable diseases, HIV/AIDS and hepatitis), improvement in nutritional status, health planning and management and socioeconomic aspects related to health.

The proposed strategies for future national health development are as follows:
♦ To consolidate the achievements in infrastructure development, service provision and disease prevention.
♦ To meet the challenges to health posed by new, emerging and re-emerging diseases and non-communicable/degenerative diseases, substance abuse and environmental degradation.
♦ To sustain the process of health development, emphasizing the quality of care and equity and efficiency issues, particularly in the context of a free market economy.
♦ To sustain and strengthen program planning and management.

THAILAND
The health policy of the government emphasizes extending service coverage to all population groups so as to efficiently respond to peoples' needs. In April 2001, Thailand became one of the first middle or low income countries to introduce universal healthcare coverage to the population. The system covers all previously uninsured people and those from the lowest income groups - more than 30% of the population. Thailand has adopted the goals of HFA and PHC as its key approach.

Health trends
Life expectancy at birth has increased over the past two decades. This has raised concerns for special services for the increasing number of older persons. The infant mortality rate (IMR) and the MMR though low, appear to be grossly underreported. In recent years, malaria has declined as an important cause of mortality. Tuberculosis related mortality has also shown a declining trend. Of the non-communicable diseases, cardiovascular disease (CVD) is the leading cause of mortality. Cancer, diabetes mellitus and road traffic accidents are also major causes of mortality. AIDS would emerge as a serious cause of mortality in the future. NCD related morbidity is rising in Thailand, while micronutrient deficiency is still significant. The move towards industrialization and urbanization has resulted in changes in lifestyles. Consumption of alcohol and tobacco are on the increase. The number of health personnel produced is still inadequate, especially for deployment at health centre level (tambon or subdistrict level). The management of health resources, particularly human resources, inequalities in health service delivery, and disparities in the allocation of resources are also issues of concern.

Health system
At central Thailand level, the Bureau of Health Policy and Planning and a training institute are responsible for health manpower development. At the community level, the MOPH supports the establishment of community PHC centers for the provision of basic services, disease prevention and health promotion. In the management process (monitoring and control), the MOPH has delegated authority to Regional Inspectors General who act on behalf of the Permanent Secretary for Public Health.

The proposed National Health Act is envisaged to steer structures and systems which would be conducive to health system reform. Major strategies addressing issues related to health behavior, disease prevention and control, and health promotion have been identified. The 8th Development Plan has introduced the concept of human-centered development. Measures to deal with protein-energy malnutrition (PEM), IDD and anemia have been included in the plan. The Department of Health gives high priority to reduce maternal and infant mortality. Currently reproductive health policies are being reviewed by the National Family Planning Committee. Despite the expanded program on immunization (EPI) being a priority program of the MOPH, some isolated population groups (hill tribes and migrating workers) remain under-served. Overall prevalence rate for leprosy had declined significantly. With the spread of HIV/AIDS, the TB cure rate has come down. Drug resistance is also rising. Malaria is still a major with migrant workers Control activities have been integrated into the local health services. The programs and activities for the treatment of common diseases and injuries are based on the standard management procedures laid down by WHO or by national consensus.

To counter the problem of a weak referral system in lieu of an impressive infrastructure hierarchy, improved systems are being developed and the concept of self-care actively promoted. Budgetary resources for health education and promotion, are still inadequate. The Ministry encourages the use of health information at all levels of management and is in the process of developing an on-line computerized information system linking all the provinces. Decision-making and management authority has been decentralized to the community level.

Thailand has established a Health Systems Research Institute as a specialized agency. The MOPH has also developed policies for provincial health offices to support their staff in the conduct of research studies. Thailand has several health insurance and security schemes covering various segments of the population. A medical services welfare scheme for the poor and the disadvantaged is intended to ensure equitable access to health care for the disadvantaged.

Thailand continues to engage in bilateral partnerships for developing health, particularly with the Japan, Australia, Germany and Sweden as well as the European Union (EU) and the seven ASEAN countries. It also collaborates with WHO and other UN agencies. As a donor country, Thailand supports health system development in Laos, Myanmar, Vietnam, Cambodia and Nepal.

National health plans and priorities
Health issues that require urgent attention in the near future include international cooperation for health, legal measures for health protection and promotion, industry and trade, inter-sectoral cooperation for health, and the integrated prevention of non-communicable diseases.

Thailand has formulated national health development strategies for the next two decades. These strategies fall under the following broad headings:
  • Improvement in efficiency and capacity of the healthcare system with better healthcare
  financing and management, and more public and private sector mix in health care provision
  • More effective promotion of healthy lifestyles and disease prevention programs
  • Improvement in public health programs and further decentralization of health management
  • Revision of legislation and administrative regulations where needed and their enforcement
  • Better use of surveillance data and health information
  • Development and utilization of appropriate health care technologies
  • Promotion and development of partnerships for health with other countries, UN agencies and
    international organizations

PAKISTAN

National public health is a recent innovation in Pakistan. National health planning began with the Second Five-Year Plan (1960-65) and has continued ever since. The National Health Policy 2001 provides an overall national vision for the Health Sector based on "Health for All" approach. It identifies ten key strategies for the health sector, which could bring about major improvements in the delivery of health care and the overall health status of the population of Pakistan. Provision of health care for the rural populace has long been a stated priority, but efforts to provide such care continue to be hampered by administrative problems and difficulties in staffing rural clinics.

Health trends

Pakistan's health indicators are among the most unfavorable in the world. In spite of a high gross national product per capita in comparison to other South Asian countries, it falls far behind the averages for health indicators for low income countries, in terms of infant mortality, mortality in children under 5, maternal mortality, and malnutrition. A high fertility rate seems to compound the present state of affairs. Forty per cent of the disease burden is communicable diseases such as tuberculosis, diarrhoeal diseases, acute respiratory infections, and preventable childhood diseases. Acquired immune deficiency syndrome (AIDS) has not yet been much of a problem in Pakistan. Both primary/secondary health care services are inadequate in terms of health personnel and equipment. Although country's health indicators have improved over time, its pace has been very slow. The poor outcome is mainly due to the ineffective delivery of services as well as the low spending on the health sector in Pakistan.

Health system

The health system in Pakistan consists of public and private sectors. The private sector provides health coverage to 70% of the population, whereas the public sector provides health services to the remaining 30% of the population of the country. The Ministry of Health is responsible for matters concerning National Planning and Coordination in the field of Health, international liaison, legislation pertaining to the drugs and medicines, administration of drugs Acts, etc.

National health plan and priorities

Until the formulation of the NHP-2001, priority was given to hospitals, medical colleges and curative services in urban areas, while primary healthcare and rural health service was ignored. The major issue in primary healthcare system was lack of human and financial resources at the BHU/RHCs. Lack in essential qualifications and management skills was another constraint. There was no referral system in operation. Thus there was an urgent need for a disciplined approach towards the healthcare management system.

The overall vision of the NHP-2001 is based on "Health-For-All" approach. It aims to implement the strategy of protecting people against hazardous diseases; of promoting public health; and of upgrading curative care facilities. Priority attention is accorded to primary and secondary sectors of health to replace the earlier concentration on Tertiary Care. The present policy will require investments and interventions by the Provincial Governments for improving health infrastructure and healthcare services. The Federal Government will continue to play a supportive and coordinative role in key areas like communicable disease control programs.

Key features of the new policy are decentralization, community involvement in running government health facilities, better coordination between government and NGOs, more female health workers, and broadening the use of health insurance, along with more specific projects for communicable diseases, reproductive health, child health, nutrition, and health education.

To concretize the vision, ten specific areas of reforms have been identified.
- Reducing widespread prevalence of communicable diseases:

This includes EPI cluster of childhood diseases, TB, Malaria, Hepatitis-B and HIV-AIDS. The National Program on EPI has been expanded through introduction of Hepatitis-B vaccine with strengthening of routine EPI facilities. The rates of immunization of children have more than doubled in the last decade. New national programs to combat Tuberculosis, AIDS and other STDs have been implemented that focus on health education, surveillance system and early detection.

- Addressing inadequacies in primary/secondary health care services:
  The main inadequacies are identified as the deficient state of equipment and medical
  personnel at BHU/RHC level. An integrated community-based approach is deployed to cover the underserved population. A model referral system in selected districts of each Province has been developed which is to be replicated countrywide. Adequately functioning facilities are being strengthened by filling up of staff positions and allocation of financial resources based on performance/utilization. Foreign assistance for the primary/secondary sectors is also sought.

- Removing professional/managerial deficiencies in the District Health System:
  Adequate financial and administrative powers have been given to the district health office to effectively manage priority programs at district level and compulsory in-service training courses at health academies. Posting policy has ensured presence of doctors at primary and secondary levels in a district.

- Promoting greater gender equity:
  This includes provision of Safe Motherhood facilities to expectant mothers, access to primary health services with appropriate referral system between the village level and the Health Care facilities up to District Hospital level.

- Bridging basic nutrition gaps in the target-population:
  The target population comprises children, women and vulnerable population groups. A food fortification program is being executed in coordination with local food industry. Mass awareness/health education programs are also conducted to augment the project.

- Correcting urban bias in health sector:
  Every Medical College, both in the public and private sectors will be required to adopt at least one district/ tehsil hospital or primary health facility in addition to the Teaching Hospital affiliated to it. The compulsory rural service of new medical graduates selected to fill up available vacancies in Government health institutes in rural areas will further contribute in promoting rural orientation.

- Introducing required regulation in private medical sector:
  The regulations are to ensure proper standards of equipment and services in hospitals, clinics and laboratories as well as private medical college and Tibb/Homeopathic teaching institutions. Each Provincial Government has developed an appropriate framework for encouraging private-public cooperation in the health sector, especially for operationalizing un-utilized or under-utilized health facilities through NGOs, individual entrepreneurs or doctors' groups.

- Creating Mass Awareness in Public Health matters:
  Optimal use is being made of multimedia to disseminate health and nutrition in close coordination with Health & Education Ministries, National Institute of Health, Health Services Academy and National Program Authorities.

- Effecting Improvements in the Drug Sector:

Balanced and fair pricing policies are being pursued to encourage investment in the pharmaceutical sector. The Family Health Workers' Health Package will also be available to the target population free of charge.

- Capacity-building for Health Policy Monitoring.
    A policy Analysis and Research Unit is proposed to be set up in the Ministry of Health. which will also be responsible for monitoring the progress of Health Policy implementation in the key areas. The unit will also provide technical facilities to Provincial Governments on need basis.

VIETNAM

Since the inception of its economic reform program in the late 1980s, with strong emphasis on the delivery of social services, and sustained improvements in infrastructure there has been a spectacular success in health trends. With the ongoing process of fiscal decentralization and rapid growth of the private sector, the ability of the Ministry of Health (MOH) to shape activities has diminished significantly. New policy tools such as user fees, health insurance and health-care funds for the poor all of which focus on the financing of health have been developed, but still fail to merge into a coherent health financing system.

Health trends

Vietnam's health indicators are better than what might be expected for a country at its stage of overall development, and continue to improve at rates that equal or surpass those in most neighboring countries. In addition to increased life expectancy at birth, Vietnam has continued to make impressive progress in reducing infant mortality and under-five mortality rates. Progress in controlling vaccine-preventable diseases, such as measles, diphtheria and tetanus, has been rapid as well. Improvements are considerable in reproductive health too.

While there are impressive achievements, Vietnam also faces serious challenges in the health sector, in particular HIV/AIDS incidence is now just at the threshold of moving from the most vulnerable groups into the general population. The emerging HIV epidemic is closely linked to tuberculosis. There is persistence of substantial disparities in health status indicators, by region, income and ethnicity, due to disparate levels of health spending. Although there are numerous National Health Programs (NHPs) by disease category, there is little coordination between those programs, and no mechanism in place to ensure that they are discontinued.

Health system

Vietnam's health system has wide population coverage with many modem and cost-effective disease control interventions and primary health care services delivered through an extensive grassroots health services network. Public investments and recurrent budget support for the grassroots health network are being given priority attention. The government's health sector strategy has emphasized active prevention, community participation, the expansion of health insurance cover, the public funding of health care expenses by the poor, the value of traditional medicine, and the active involvement of the private sector under the government's leadership.

The commune-level health center (CHC) is considered the foundation of the primary health care system in Vietnam for both preventive and curative care. However, people are using the CHCs only for preventive care, relying on private providers for curative care. But the role of private providers in curative care at the commune level is not adequately addressed in the government's strategy of strengthening curative services.

In Vietnam, only about one-fourth of health spending emanates from the public sector, with the preponderance paid by private sector sources. Following the failure of the Hunger Eradication

and Poverty Reduction and similar programs aimed at health interventions, in 2002, a ministerial decree called for the nation-wide implementation of Health Care Funds for the Poor (HCFP) which is to be managed from the provincial fund. Provinces can allocate HCFP resources to the direct reimbursement of health care costs, or to the purchase of health insurance cards. In addition to HCFPs, there have been a range of targeted programs in place, aimed at improving livelihoods through exemptions of user fees, access to credit or the development of local infrastructure. The National Strategy of Prevention and Control has several ambitious targets for prevention and public awareness of HIV/AIDS.

Starting in 1989, the Government sought additional means to finance and support health services. In 1992, the Government introduced compulsory and voluntary health insurance schemes, administered by Vietnam Health Insurance (VHI) under the aegis of the MOH.
Currently three forms of the insurance scheme operate:
1. Compulsory coverage: This covers all active and retired workers in the public sector and all salaried workers in private sector enterprises with 10 or more workers.
2. Voluntary schemes: These include health insurance for school children, with a per capita contribution collected by the educational institutions; and the Farmer Voluntary Insurance Scheme.
3. Schemes fully subsidized by the Government: These include reward schemes for merit, free health cards for the poor, etc.

Vietnam can only revamp its health financing policies through better coordination of external health groups, both commercial as well as international donors.

National health needs and priorities
In March 2001 the Government of Vietnam prepared a "Strategy for People's Health Care and Protection 2001-2010." One of the objectives for health care reform during the decade was to "improve equality in access to and use of health care services to improve quality of health care services in all levels" .Two key recommendations are made to achieve this objective:
• Renovating the health insurance system to regulate the financial relationships between the users and providers.
• Seeking new approaches to strengthen the quality and efficiency of the commune- level curative care services.

SINGAPORE
The state of health in Singapore is good by international standards. According to the Ministry of Health, rising standards of living, high levels of education, good housing, safe water supply and sanitation, quality medical services, and the active promotion of preventive medicine all have helped to significantly boost the health of Singaporeans.

Health trends
Singapore's health indicators are comparable to that of a developed country with low mortality rates and high life expectancy at birth. The incidence of communicable diseases like TB remains low and is often seen in the elderly males. Just as the improved standard of living and environmental conditions have led to reduction in infectious diseases, non-communicable diseases like cancer, heart disease, pneumonia, and cerebrovascular diseases have become leading causes of death. Life-style associated diseases are also common and account for morbidity. Immunization coverage remains high. The number of cases reported with HIV/AIDS has been increasing over the years, but still remains low in comparison to other Asian countries.

Health system

Two health care delivery "cluster" systems are available to Singaporeans. The western cluster, the National Healthcare Group, provides comprehensive public health care through a network of four hospitals, one national center, nine polyclinics, three specialty institutes, nine business divisions, and more than 11,000 staff members. The eastern cluster, Singapore Health Services, offers three hospitals, five national specialist centers, a network of primary health care clinics, and more than 12,000 staff members. Medical insurance is available via Medisave for hospitalization and some outpatient services, Medifund for those unable to pay for their medical expenses, Medishield for catastrophic illness, and Eldershield for senior citizens with severe disabilities. Traditional Chinese medicine also is widely practiced.

Specific disease control programs have been developed for both communicable and non-communicable diseases, each with its own strategy encompassing primary, secondary and tertiary components. A well established surveillance system has been employed for monitoring communicable diseases. The Health Promotion Board was set up in 2001 to spearhead health education, promotion and prevention programs and to create a supportive environment to address major health problems. Accessible and appropriate services for the elderly have been devised. Measures to ensure high professional standards of healthcare personnel are also in place. The National Medical Research Council is the parent body for promotion and funding of medical research in Singapore.

National health plans and priorities
The Ministry has identified specific desired health outcomes in line with their mission statements and have formulated strategies to achieve them.
- Promote good health and reduce illnesses; the Ministry is focusing on health promotion programs and comprehensive disease management plans.
- Ensure good and affordable healthcare; the Ministry is reviewing the '3Ms' health financing framework (Medisave, MediShield and Medifund), setting up a framework of integrated healthcare services for the elderly and contracting private practitioners to provide responsive and subsidized primary healthcare to elderly Singaporeans.
- Pursue medical excellence; the Ministry is strengthening the training regime for doctors and introducing clinical quality assurance programs.

The healthcare delivery system was re-organized into two vertically integrated delivery networks, National Healthcare Group (NHG) and Singapore Health Services (SHS). This is to enable more integrated and better quality healthcare services through greater co-operation and collaboration among public sector healthcare providers.

The MOH's priorities include to build a population based on a healthy lifestyle, manage disease holistically, exploit IT maximally to increase productivity and enhance patient care, counter disease outbreak with enhanced surveillance, manage medical inflation, ensure long-term healthcare financing, safeguard medical standard by developing manpower and facilities and appropriate regulations and exploit economic value as regional medical hub.

AFGHANISTAN
In order to address the alarming health trends produced by the last twenty years of war, three major donors (EC, USAID, and World Bank) are investing considerable sums of money to rehabilitate Afghanistan's devastated health system. Together with the Ministry of Health, they are funding Non-State Providers (NSPs) to deliver a Basic Package of Health Services (BPHS) and an essential package of hospital services (EPHS), through various mechanisms. Despite the progress in coverage of these health services, signs of donor fatigue hint at problems with further

expansion and sustainability, and insecurity is hampering NGO efforts for health services delivery.

Health trends

Afghanistan's health indicators still lag significantly behind other countries in the region. The infant and child mortality rates are overwhelming, ranking fourth highest in the world. While the overall rate of acute malnutrition is considered relatively low, factors such as micronutrient deficiencies, sustained food insecurity and poor caring practices have combined to produce a high, chronic malnutrition rate. Infectious disease contributes heavily to the burden of disease with diarrhoea, acute respiratory infections and vaccine preventable illnesses accounting for an estimated 60% of deaths among children. Tuberculosis disproportionately affects females. The health of Afghanistan's women and girls has suffered tremendously due to a combination of factors including lack of female health staff, gender segregation and restrictions placed on the female population by local traditions. Afghanistan has the second highest maternal mortality in the world.

Health system

Currently there are two service delivery mechanisms: the Ministry of Public Health strengthening mechanism (MoPH-SM) and contracting out to NGOs. The Ministry of Public Health is committed to ensuring the accelerated implementation of quality health care for all the people of Afghanistan, through targeting resources especially to women and children and to under-served areas of the country, and through working effectively with communities and other development partners. The main components of the BPHS are primary health care issues like Maternal and newborn health, Child health and Immunization, Public Nutrition and Communicable diseases. The essential package of hospital services, EPHS encompasses a comprehensive referral network of secondary and tertiary hospitals.

Substantial inequities exist in the distribution of health facilities and services both between and within provinces throughout the country. Perhaps one of the biggest challenges facing the health sector is human resources; there is an enormous distortion in the distribution of health professionals. About 40% of facilities have no female health provider at all, which, given the restrictions placed on women, creates a serious barrier for them to access health services. Recruitment of skilled staff in rural areas presents difficulties in the present milieu of insecurity and also due to the lack of physical and social infrastructure. The adverse effects of the Taliban regime on medical education mean that the quality of medical skills may be questionable. Routine immunization is offered in only some BPHS facilities. Other significant challenges in the health sector include lack of infrastructure, weak managerial capacity particularly at the provincial level, slow roll out of systems to the provinces, problematic and seasonal variations in geographical access, lack of security throughout the country and obtaining additional funds.

Despite these abysmal health conditions and the state of the health system there have been rapid strides forward in the health sector since 2001. The Ministry of Public Health made impressive post conflict achievements in the five following areas: information gathering, disease prevention, health reforms, donor coordination and physical construction. There has been development of numerous policies and strategies to guide health system development and investment, with the contribution and participation of all stakeholders. This has increased ownership and thus commitment to uphold national policy. The successful coordination between NGOs and the MOH, and amongst donors have prevented duplication of service provision. A new midwifery training curriculum has evolved. Polio and measles vaccination campaigns have reduced the number of cases in the country. The country has witnessed the start of the Priority Reform and Restructuring (PRR) of the MOH civil service; proposals for the Provincial Health Department

(including Provincial Health Offices) and the Policy and Planning General Directorate have been approved with the remaining Directorates expected to follow suit in 2005.

National Health Plans and priorities
The National Health Policy 2005-2009 states its core values: Right to a healthy life; greater equity; concern for women, children and other socially disadvantaged groups; and the need to address the problem of poverty by being pro-rural. The goal of the new policy is to develop the health sector to improve the health of the people of Afghanistan, through implementing the basic package of health services (BPHS) and the essential package of hospital services (EPHS) as the standard, minimum of health care to be provided at each level of the health system.

In order to achieve the National Health Policy goal and objectives, the Ministry has identified certain priorities under three broad categories:
- Implementing health services: Apart from implementing BPHS and EPHS, this includes strategies to plan for strengthening the coverage of equitable, affordable and sustainable quality support programs. Geographical areas where there are no government health services, populations living in underserved areas, emergency withdrawal or collapse of contracted-out services are spheres that are being considered. The Ministry is exploring payment exemption strategies for the poor. Immunization, maternal delivery, antenatal care, family planning, treatment of TB, and nutrition interventions will be provided free of charge to all citizens. The Ministry of Public Health will focus on prevention and promotion programs for key emerging public health problems. Greater community participation and increased coordination of health services are other areas of priority.
- Reducing morbidity and mortality This objective will be realized by improving access to quality maternal and reproductive health care and enhancing the quality of child health initiatives. Issues in adolescent health such as communicable diseases, sexually transmitted infections (STIs), HIV/AIDS, smoking, etc. should be addressed. The coverage and quality of communicable disease control programs should be expanded. Efforts to reduce prevalence of malnutrition among children and adults should be more functional with multi-sectoral interventions.
- Institutional development Strengthening institutional and management development at central and provincial levels is one of the components. Decentralization of health systems and services and development of affordable and functioning communications network using modern information and technology systems at all levels is being considered. Furthering capabilities of health professionals, especially of female staff would be another mechanism to ensure quality health services. The monitoring of existing national health accounts and coordinating different sources of funding can help to establish effective and cost-efficient delivery of health services. Nationally led health systems research, related to the many reforms the Ministry is introducing, is a priority. More public and private sector regulations and laws should be enforced.

MALAYSIA
The illness-prevention and maintaining wellness themes of the Malaysian health system has helped Malaysia stand out for its success in improving health conditions, in spite of challenges like occupational and environmental health, the need to upgrade primary health care through the introduction of new technologies, and to improve regional equity in health care standards. The country has improved its health care and social conditions and is considering a national health insurance plan.

Health trends

Malaysia enjoys a comparatively high standard of health, the result of long-established health and medical services. Life expectancy has risen over the last decade. Both communicable and non-communicable diseases remain a burden in Malaysia. The top five diseases are dominated by non-communicable diseases, similar to the disease burden of a developed nation. A study of the MOH in collaboration with the WHO found that the five most common diseases in Malaysia were ischemic heart disease followed by mental illness, cerebrovascular disease/stroke, road traffic injuries and cancers. Though cases of TB have declined, Malaria remains a common disease in Malaysia. New data show rising rates of behavioral, environmental and occupational health problems, stoked by the country's rapid urbanization and industrialization. HIV/AIDS is also an emerging problem. Immunization rates in the country are quite high. A small fraction of children under five are still considered malnourished.

Health systems

The major provider and financier of health services is the Ministry of Health. The private health sector, whose role has been increasing over the past few decades, provides health services through private hospitals and clinics especially in urban areas. Other health care providers include traditional and complementary medicine (TCM) practitioners and nongovernmental organizations. With the emergence and rapid growth of private health care insurance and managed care organizations, the need for a national health care financing mechanism to provide affordable, comprehensive, equitable and accessible services, both in the public and private sectors, for people of all levels of socioeconomic status is imminent.

While the Seventh Plan focused on an expansionary development program, the Eighth Plan concentrated on improving the quality of public health and curative services.

During the Eighth Malaysia Plan period (2001-2005), primary healthcare remained the focus of national health development .Strenuous efforts were continued to improve accessibility, quality and fairness in the provision of health services for the population, and optimize utilization of resources in the delivery of healthcare. There was further development and expansion of the scope of primary, secondary and tertiary healthcare, greater use of IT in the delivery of health services as well as more emphasis on increasing the capacity and capability of health personnel and allied health professionals in both public and private sectors. The mass media and the internet have been utilized for health awareness programs. Efforts are underway to strengthen the telehealth system so as to promote Malaysia as a regional centre for health services. Programs such as occupational safety and health, geriatric care, mental health and prevention and control of emerging diseases and reemerging infections were expanded. Research and development (R&D) in health services was further enhanced with the focus being on public health including clinical health systems, health management and health promotion and epidemiology as well as biomedical technology. The development of a healthcare financing scheme to ensure appropriate cost sharing, thereby ensuring maximum benefits to the consumers were other priorities. Regulations under the Private Healthcare Facilities and Services Act 1998 have been enforced to improve the quality and access to private health services, complementary to the public sector. The Act provides for equitable distribution of accredited facilities, the deployment of qualified health and allied health personnel and the maintenance of affordable medical charges.

National health plans and priorities

The Ninth Malaysian plan (2006-2010) envisages development of Malaysia as a regional centre for health tourism in both traditional and modern health treatments. This entails development of comprehensive health services packages. Promotional efforts will also be enhanced through the establishment of a brand for Malaysian health services, which will be known as 'Health Malaysia'. Facilities for health care will be improved to provide for an active and alert society. Current

facilities will be upgraded whilst new facilities will be built to provide a comprehensive package of services. Mobile clinics will be increased to improve healthcare services in rural areas. Primary, secondary and tertiary healthcare services will be integrated through an efficient and effective referral system. A human resource action plan will be drafted and adequate funds will be allocated to human resource development in healthcare.

Malaysia's Vision for Health is to be a nation of healthy individuals through a health system that is equitable, efficient, technologically appropriate, environmentally adaptable and consumer-friendly. It emphasizes on innovation, health promotion, respect for human dignity, individual responsibility and community participation.

The mission of the Ministry of Health is to build partnership for health to facilitate and support the people to attain fully their potential in health, motivate them to appreciate health as a valuable asset, take positive action to improve further and sustain their health status to enjoy a better quality of life.

Current health promotion and prevention services are still perceived to be disease- oriented rather than wellness-oriented. In achieving the Vision for Health and Mission of the Ministry of Health, the activities carried out by the health sector must be in line with the eight goals of the health services: wellness; person-focused; informed person; self-help; care provided at home or closer to home; seamless, continuous care; services tailored to individual or group needs; and effective, efficient and affordable services.

PHILIPPINES

Health trends
The population growth rate presents serious challenges to the delivery of health services. There is a need for continuous investment in basic health services to ensure that the demand is met. Rural health is affected by difficult access to health services and the presence of locally endemic diseases like malaria, filariasis and schistosomiasis. The four leading causes of morbidity are communicable diseases; globally, the Philippines ranks eighth among countries with a high burden of tuberculosis. The prevalence of non-communicable diseases like cancer, hypertension and other heart diseases is increasing. The infant mortality rate is still high compared with those of neighboring countries. The maternal mortality ratio has barely improved. Nutritional problems and parasitism are common among children. Accidents and other forms of violent death are also significant. Ill-timed or unwanted pregnancies, induced abortions (often in hazardous conditions), and sexually transmitted infections, including HIV are other areas of concern. Outbreaks of malaria, dengue, measles, cholera, typhoid, hepatitis A and diarrhea have been witnessed in the period from 2000-2004. In 2004, the country also experienced both natural and man-made disasters, which caused the detour of health priorities to disaster-related resources and approaches.

Health systems
The Department of Health maintains specialty hospitals, regional hospitals and medical centres. Regional field health offices (Centers for Health Development) manage provincial health teams and retained personnel. The provincial governments oversee provincial and district hospitals, while the municipal governments manage rural health units (RHUs) and barangay health stations.

The country's health care system has a restricted capacity to deliver better health outcomes. Some of the constraints are poor health care financing; a health service system that excessively relies on use of high-end hospital services rather than primary care, an ineffective mechanism for

providing public health programs; the brain drain of health professionals; excessively high price of medicines, out-of-pocket payments; inadequate enforcement of regulatory mechanisms; and the insufficient effort expended on prevention and control of new diseases. Issues such as geographical inequity and socioeconomic inequity continue to abound in the country. Data adequacy, accuracy and timeliness are other important issues, which when dealt with could help to make appropriate decisions on policies and programs to improve health care.

The National Health Insurance Program (NHIP) has a present coverage of 81% of the country's population and has been successful in its indigent program, whereby national and local governments jointly subsidize the annual premiums of indigents in each community.

National health plans and priorities
The focus is for interventions in delivery of health services to the masses to promote equity, fairness and immediate action and improve the quality of life of all Filipinos, especially the poor. The Government has developed the National Objectives for Health (NOH), a document that states the national goals for health, objectives and strategies to undertake a common vision in partnership with all stakeholders. Some of the priority health programs of the Philippines are:
  - To lower the price of medicines and make good quality health services affordable.
  - Social health insurance through the Philippine Health Insurance Corporation (PhilHealth) to make quality primary, secondary and tertiary care services more accessible to underserved communities.
  - Disease control and prevention programs to increase the detection rate and further improve the treatment outcome of communicable diseases.
  - Expanded Program on Immunization
  - Maternal Care and Family Planning – The program aims for safe deliveries and prevention of complications of pregnancy, and promotion of exclusive breast-feeding.
  - HIV/AIDS/STI Prevention and Control Program– Serological and behavioral surveillance and prevention programs have been implemented in high risk areas. Partnership and collaboration are strong support mechanisms of the program.
  - Healthy lifestyle promotion
  - The Sentrong Sigla Programaims to promote availability of quality health services in health centres and hospitals and make these services accessible to every Filipino. It develops and promotes standards for health facilities.
  - As a strategy to effectively reduce tobacco consumption and exposure to tobacco smoke, the Department of Health is recommending the imposition of price and tax measures.

MONGOLIA

The acute economic distress in the early 90's led to a major loss of resources resulting in deterioration of health services. Mongolia is experiencing the health problems associated with both developing and developed countries with a constrained economic base. Presently, the health status of the people in Mongolia is relatively better than that of an average low-income country. Aggravating factors affecting the health system include a thin population spread over huge areas, growing patient expectations, and an overprovided health system with problems in cost-effectiveness.

Health trends
The country is undergoing an epidemiological transition characterized by a decline in communicable diseases and a rise in non-communicable diseases like cardiovascular diseases, cancer accounting for total mortality. The leading causes of mortality form 1995 up to the present are disease of the circulatory system, cancer, accident and injuries. Self-medication, including

self-injection, is a problem, which mirrors the irrational use of drugs and injectables in health care settings. Excessive maternal mortality is a priority concern of the Ministry of Health. The infant and under-5 mortality rates have had a four-year downward trend, partially as a result of high immunization coverage. Other contributing actions include well-implemented programs to reduce mortality for diarrhoeal diseases and respiratory infections and, more recently, the result of extended implementation of integrated management of childhood illness (IMCI) programs. Mongolia, however, still suffers from excessive malnutrition, rickets, anemia and iodine deficiency disorders, and there has been no significant improvement in the nutritional status of children during the last decade. The high cost of travel for the rural population acts as a barrier to access basic diagnostic or advanced health care services.

Sexually transmitted infections, viral hepatitis and tuberculosis continue to be the top infections. Despite the high likelihood of HIV spreading and the massive HIV epidemic in the two neighboring countries (China and Russia), Mongolia is still a very low prevalence country.

Health systems
A large portion of the health budget is still spent on curative services. Social health insurance (introduced in 1994) covers majority of the population, with the state subsidizing the premiums for most of those insured.

Weaknesses in hospital services include inefficiency, patient dissatisfaction, outdated treatment protocols and equipment. Family group practices (FGPs) model was introduced in 1988 by the Health Sector Development program for improving the quality of primary health care and bringing services close to clients free of charge. In an effort to provide tertiary-level health services on a regional basis, few provincial hospitals were upgraded to regional diagnostic and treatment centers. Inter-soum hospitals were approved in 2001 to provide higher levels of primary health care to the population of two or more neighboring districts (soums). However, the populations served by soum hospitals have inadequate access to essential medicines or acceptable sanitation facilities.

The number of private hospitals and pharmacies has increased in the recent years. Despite the relatively high number of organizations, the private sector is not well developed due to low purchasing power, lack of managerial capacity and a traditionally large public sector. The Ministry of Health planned an integrated prevention and control program for NCDs in 2001, with WHO support. In addition, the Parliament has ratified the Framework Convention on Tobacco Control. Clear advances have been made in reducing maternal and child mortality with high-level government support and other contributing and collaborating organizations. In April 2004, the Ministry of Health received approval from the Global Fund and WHO for the tuberculosis combat project. A human resource development policy, approved in November 2003, is focused on planning, development, distribution and management of human resources in 2004-2013. Traditional medicine is still popular and plays a prominent role in the health care economy.

National health plans and priorities
According to the Government's Plan of Action, the health priorities are to provide good quality primary health services, improve rural health care, develop the private health sector and expand health insurance coverage. Health legislation and most national health programs have been updated in the last few years. However, program implementation depends on international support, as government health spending is mainly used for inpatient care.

Since 2002, the government has been implementing a new regulation of health system organization and financing with output based funding. In 2003 the Ministry of Health, with the support of the Government of Japan (JICWELS), started a project to develop a health sector

master plan for the next 10 years. Recently, new policies and programs were initiated that address the most pressing health issues

Despite successful efforts, the health sector is facing problems related to the deepened marginalization of some of the population, internal migration and the number of homeless people as well as poor living conditions. Other problems are unequal health status and access to health services between the rural and urban populations, and between different income groups, high maternal and child mortality, despite recent improvements.

CAMBODIA

Health trends
The population aged 65 years or more is significantly increasing resulting in a number of emerging non-communicable or chronic diseases such as cardio-vascular disorders, cancer and diabetes. As commercial and industrial sectors expand, the health sector is also witnessing higher incidents of work-related problems, injuries, and road traffic accidents. Another cause for concern is the fact that 80 per cent of the people seeking health services have had to use savings, or even borrow or sell assets to pay for health care costs.

Cambodia has a high infant and under-five mortality rate. The maternal mortality rate is also seen to be very high in comparison with other western pacific countries. Cambodia has been categorized as one of the high burden countries with respect to Tuberculosis incidence. HIV seroprevalence rate has been showing signs of stabilization. Both urban and rural fertility have decreased over the recent past. Malnutrition and under-nutrition is still widespread though there seems to be a reduction in prevalence of stunting, wasting and underweight children when compared to statistics from 2000.

National health plans and priorities
The Mission of the Ministry of Health, Royal Government of Cambodia is committed to ensure sector wide equitable, quality health care for all the people of Cambodia through targeting resources, especially to the poor and to areas in greatest need. The national health policy forms the basis for the 2003-2007 policy statement of the Ministry of Health, Kingdom of Cambodia. The elements in the policy statement call for provision of basic and efficient health services to the people of Cambodia with active community participation. It also aims for affordable, essential specialized hospital services. It seeks to implement sector wide management through a common vision and effective partnerships among all stakeholders. Decentralization within the health sector is another area of action. It emphasizes prevention and control of communicable and selected chronic and non-communicable diseases. MCH/FP is the other active component of the policy. The policy promotes healthy lifestyles and aims at optimization of human resources through appropriate planning. Effective public and private partnerships for basic and specialist care are promoted. The plan signifies effective use of the health information for evidence-based planning, implementation, monitoring and evaluation in the health sector. It believes in health financing systems to promote equitable access to priority services especially for the poor. The policy concentrates on further development of appropriate health legislation to protect the health of providers and consumers.

The range of work for implementation in the strategic plan would be determined by these demographic and health concerns; rise in infant and child mortality, high rates of under-nutrition among women and malnutrition among children, high maternal mortality ratio, high case fatality from infectious diseases particularly HIV/AIDS, TB, and malaria, high total fertility rate, unhealthy lifestyles and inappropriate health seeking behavior.

To get the above stated results the government, during the period 2003-2007, will give priority to six areas of work:

I. Health service delivery

Under this theme, efforts will be to improve coverage of health services especially for the vulnerable groups through planning the location of health facilities, to strengthen the delivery of quality care, devise cost-effective interventions to control communicable diseases and strengthen the management and coverage of support services.

II. Behavioral change

Change in the attitudes of health providers and consumers is required for the development of quality health services. Promotion of appropriate health seeking behavior through advocating for healthy environments and enforcing counselling and behavioural change activities are some of the measures.

III. Quality improvement

Develop and implement minimum and optimum quality standards for the public and private sectors incorporating pro-poor and gender issues through the use of appropriate tools.

IV. Human resource development

Increase the number and performance of healthcare professionals through basic training and continuing education. Enhance the management and technical skills and competence of the entire Ministry of Health workforce through quality, comprehensive training, education, retention and support measures.

V. Health financing

Regular and adequate flow of funds to the health sector must be ensured with advocacy to increase resources. Alternative health financing schemes are to be planned to improve the accessibility of health services for the poor.

VI. Institutional development

This refers to organisational and management reform of systems in the Ministry of Health to respond effectively to change. It also promotes public private partnership to improve accessibility, quality and affordability though enforcement of regulations.

It enhances the Ministry's capacity to address chronic diseases and emerging public health problems through raising awareness and developing comprehensive plans.

It aims to further develop the health sector by increasing effective decentralization and institutionalizing sector wide management.

Appendix VI – Environmental Scan for e-Health Readiness

A)   Application of InfoDev's Tool

For each country the following InfoDev questions were considered, and available secondary data used to respond. (Note; the questions in the section *Information needs in the country* were modified to redirect attention from HIV/AIDS to e-Health).

Telecommunications environment:
• What is the nature of the country's infrastructure? Think about availability of connections, reliability and speed of transmission.
• What technical support services are available?
• What are the connection costs?
• What are the hardware costs?

Score:
1 = Non-existent, or extremely poor throughout the country, costs of hardware and connections generally high.
2 = Poor throughout the country, costs of hardware and connections generally high.
3 = Reasonable service in the cities but poor in provincial regions, costs of hardware and connections vary by region.
4 = Good, reliable service in the cities and some services in provincial regions, costs of hardware and connections variable.
5 = Good, reliable service throughout the country, costs of hardware and connections variable.

Socio-cultural factors:
• What is the nature of the political environment?
• To what extent are organizations open to new ideas and able to exercise initiative and innovation?
• Are the organizations willing to evaluate and compare the performance of their organization?
• Are there specific cultural factors that have an impact on how people communicate?

Score:
1 = Centralized, hierarchical, afraid or disinterested to share information and exchange ideas, information strongly controlled by government.
2 = Centralized and hierarchical, will exchange information with specific organizations, some level of control over content of information.
3 = Will exchange information with specific organizations.
4 = Open, collaborative, willing to exchange information and share ideas between organizations within country, less desire/willingness to share ideas with other countries because of language difficulties or believe it is irrelevant.
5 = Open, collaborative, willing to exchange information and share ideas between organizations within country and internationally.

Language barriers:
• Does a language barrier exist?
• Is there a common local (intra-country) language? (The issue of a common regional (inter-country) language is addressed later in this section)

Score:
1 = National language is the only language spoken by the majority of people.
2 = People have some skills in English or another common second language.
3 = Many people are well skilled in English or another common language.

Information needs in the country:
How developed is the country's response to the e-Health adoption?

1 = National response started very recently, very limited amounts of information in the country, and public has little knowledge of e-health.
2 = National response started several years ago, moderate amount of information available in country and public has limited knowledge e-health.
3 = National response commenced many years ago, much information is available in the country already, public are reasonably informed about e-health.

Applying InfoDev's tool provides the following assessment for selected Asian countries (Table 7).

Table 7. Readiness Assessment of Select Asian Countries			
COUNTRY	**QUESTION**	**SCORE**	**TOTAL SCORE** 4-8=L; 9-12=M; 13-16=H
Afghanistan	*A. Telecommunications*	1	6 (Low)
	B. Socio-cultural	3	
	C. Language barriers	1	
	D. Information needs	1	
Bangladesh	*A. Telecommunications*	3	8 (Low)
	B. Socio-cultural	2	
	C. Language barriers	2	
	D. Information needs	1	
Bhutan	*A. Telecommunications*	1	5 (Low)
	B. Socio-cultural	2	
	C. Language barriers	1	
	D. Information needs	1	
India	*A. Telecommunications*	4	14 (High)
	B. Socio-cultural	5	
	C. Language barriers	3	
	D. Information needs	2	
Iran	*A. Telecommunications*	3	7 (Low)
	B. Socio-cultural	2	
	C. Language barriers	1	

	D. Information needs	1	
Maldives	*A. Telecommunications*	2	
	B. Socio-cultural	3	8 (Low)
	C. Language barriers	2	
	D. Information needs	1	
Nepal	*A. Telecommunications*	3	
	B. Socio-cultural	2	8 (Low)
	C. Language barriers	2	
	D. Information needs	1	
Pakistan	*A. Telecommunications*	3	
	B. Socio-cultural	3	11 (Medium)
	C. Language barriers	3	
	D. Information needs	2	
Sri Lanka	*A. Telecommunications*	3	
	B. Socio-cultural	2	8 (Low)
	C. Language barriers	2	
	D. Information needs	1	
China	*A. Telecommunications*	4	
	B. Socio-cultural	2	9 (Medium)
	C. Language barriers	1	
	D. Information needs	2	
Hong Kong	*A. Telecommunications*	5	
	B. Socio-cultural	3	14 (High)
	C. Language barriers	3	
	D. Information needs	3	
Macao	*A. Telecommunications*	2	
	B. Socio-cultural	3	7 (Low)
	C. Language barriers	1	
	D. Information needs	1	
Japan	*A. Telecommunications*	5	
	B. Socio-cultural	5	15 (High)
	C. Language barriers	2	
	D. Information needs	3	
Mongolia	*A. Telecommunications*	1	6 (Low)
	B. Socio-cultural	2	
	C. Language barriers	2	

	D. Information needs	1	
Republic of Korea (South Korea)	*A. Telecommunications*	5	12 (Medium)
	B. Socio-cultural	3	
	C. Language barriers	2	
	D. Information needs	2	
Democratic People's Republic of Korea	*A. Telecommunications*	2	5 (Low)
	B. Socio-cultural	1	
	C. Language barriers	1	
	D. Information needs	1	
Philippines	*A. Telecommunications*	4	14 (High)
	B. Socio-cultural	5	
	C. Language barriers	3	
	D. Information needs	2	
Singapore	*A. Telecommunications*	4	15 (High)
	B. Socio-cultural	5	
	C. Language barriers	3	
	D. Information needs	3	
Thailand	*A. Telecommunications*	4	13 (High)
	B. Socio-cultural	5	
	C. Language barriers	2	
	D. Information needs	2	
Vietnam	*A. Telecommunications*	2	8 (Low)
	B. Socio-cultural	3	
	C. Language barriers	2	
	D. Information needs	1	
Cambodia	*A. Telecommunications*	2	7 (Low)
	B. Socio-cultural	3	
	C. Language barriers	1	
	D. Information needs	1	
Indonesia	*A. Telecommunications*	3	11 (Medium)
	B. Socio-cultural	3	
	C. Language barriers	3	
	D. Information needs	2	
Malaysia	*A. Telecommunications*	4	14 (High)
	B. Socio-cultural	5	
	C. Language barriers	3	

	D. Information needs	2	
Myanmar	A. Telecommunications	1	6 (Low)
	B. Socio-cultural	3	
	C. Language barriers	1	
	D. Information needs	1	
Lao PDR	A. Telecommunications	1	9 (Medium)
	B. Socio-cultural	5	
	C. Language barriers	2	
	D. Information needs	1	
Timor-Leste	A. Telecommunications	1	6 (Low)
	B. Socio-cultural	2	
	C. Language barriers	2	
	D. Information needs	1	
Brunei Darussalam	A. Telecommunications	3	9 (Medium)
	B. Socio-cultural	2	
	C. Language barriers	3	
	D. Information needs	1	

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18. **Republic of Korea (S. Korea)**
   Nil.

Appendix VII - Potential Lead Institutions and Researchers

Institutions identified below have health studies as an area of priority and thus could contribute to the planned PAN Asian e-Health Research Network. Before engaging in close discussions regarding potential partnership with the Network, due diligence is recommended to confirm the standing and capability of some institutions, and to identify suitable researchers within the institutions.

BANGLADESH

1. Bangladesh Institute of Development Studies (BIDS)

The Bangladesh Unnayan Gobeshona Protishthan or The Bangladesh Institute of Development Studies (BIDS) is a multi-disciplinary organization for policy-oriented research on development issues in the context of Bangladesh. BIDS serves as a conduit for promoting study, research and dissemination of development information in the fields of economics, demography, and other branches of social sciences including those relating to planning for national development and social welfare, through its library, publications, website and seminar programs. BIDS researchers also directly contribute to formulation of development policies through participation in government committees and task forces. The research division at BIDS includes a Human Resources Development Division (HRD), its mandate is to carry out research on issues related to human resource development. Thus, education, health, nutrition, poverty, and gender issues are the major areas of focus in this Division.

2. Bangladesh Research and Development Association (BRADA)

BRADA is a non-political and non-profit organization with the sole objective of supporting research and development in Bangladesh with specific stance in using Global Information System via internet) . It started as an association and meeting place of some like minded people from the University of Dhaka, Dhaka and Jahangirnagar University, Savar. Later, it became a formally registered organization under the Societies Registration Act 21 of 1860 with declared objective to inculcate ICT culture in Bangladesh in the sphere of education and research. The activities of the Society as declared in its constitution are 1) Assisting R & D in Bangladesh; 2) Actively assist other relevant organizations including government, non-government, autonomous, corporate, NGOs in applying ICT by increasing their capacity in automation, computerization and Internet use, 3) Develop own projects in ICT, and assist others to formulate , approve, implementation and operation their projects in ICT spheres, and 4) to establish communication links with national and international organizations, and with relevant UN organizations.

3. Bangladesh Rural Advancement Committee (BRAC), Research and Evaluation Division (RED)

Established in 1975 to provide research support to BRAC programs, RED conducts multidisciplinary studies on various development issues and subjects of national and global importance. These include poverty alleviation, socioeconomic development, agriculture, nutrition, health, population, education, environment, gender, and related fields. It maintains strong linkages with the government organizations, UN bodies, and a number of academic and research institutions at home and abroad. Probably the largest NGO research division in the

world, the Research and Evaluation Division (RED) undertakes many of its studies in cooperation with international research and academic institutions of the highest caliber.

4. Centre for Health and Population Research (ICDDR,B)

The International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B), popularly known as Cholera Hospital in Bangladesh, is an international health research institution located in Dhaka, the capital of Bangladesh. With the changing trend in the world scenario in health and population over the years, ICDDR,B has expanded its activities to address some of the most critical global health needs. Hence it is now becoming well-known as ICDDR,B: Centre for Health and Population Research (the Centre). The Centre's activities are supported by about 55 donor countries and organizations, including Government of Bangladesh, UN specialised agencies, foundations, universities, research institutes and private sector organizations and companies that share the Centre's concern for the health problems of developing countries and value its proven experience in helping solve those problems. The Centre conducts research, training and extension activities as well as program-based activities outlined in separate leaflets in the folder.

5. Bangladesh Medical and Research Council (BMRC)

BMRC is a focal organisation for health research established in 1972 by order of the President as an autonomous body under the Ministry of Health and Family Welfare. It has the objectives of identifying problems and issues relating to medical and health sciences and determining priority areas in research on the basis of healthcare needs, goals, policies and objectives. The functions of BMRC are: to identify problems and issues relating to medical and healthcare needs; to organize and promote scientific research in various fields of medicine, public health, reproductive health and nutrition with specific references to primary healthcare needs; to initiate, assist, promote and coordinate scientific research in the field of health in medical institutions and to help such institutions in developing expertise and facilities for health research; to train manpower in health research through workshops/training programmes; to organize and disseminate research information through publications, research seminars, and orientation courses; and to arrange for the application and utilization of the results of health research.

BHUTAN

1. The Centre for Bhutan Studies

The Centre for Bhutan Studies is an autonomous research institute dedicated towards promoting research and scholarship in Bhutan. It is governed by the Council for the Centre of Bhutan Studies. The Centre conducts inter-disciplinary studies of Bhutan in its social, cultural, and economics aspects, focusing largely, but not exclusively, on contemporary issues, supports basic research by other agencies in Bhutan, encourages participation of younger scholars in research, serves as a vehicle to train individuals in research skills to analyze, in particular, contemporary issues. The Centre promotes scholarship on Bhutan through its publications, hosting conferences and seminars, organizing workshops and lecture series. Other organization and intuitions both within and outside the country also collaborate in these activities.

2. Department of Information Technology

The Internet was introduced into Bhutan in 1999. With it Bhutan joined the multitude of nations aspiring to harness the power of Information and Communications Technology (ICT) to achieve further progress. The Applications Division of the Department of Information Technology:

- Conducts research and recommends government wide and private sectors for the adoption and use of software applications and ICT operating Systems.
- Draft guideline for the development and quality control of software applications and recommend these guidelines to the policy and promotion division for formulation as technical policy guidelines as appropriate.
- Identify the areas of application. development in the government organizations and initiate the development.
- Encourage, facilitate and coordinate the creation of e-services (Like e- government, e-learning, e-health, e-commerce) in order to promote innovative information programs.
- Organize workshops and seminars on emerging technologies.

3. Center for Educational Research and Development

The Center for Educational Research and Development (CERD) is a part of the National Institute of Education, Paro. It focuses on the coordination of research activities related to curriculum implementation, teacher development and educational programs.

INDIA

1. Indian Council of Medical Research (ICMR)

The Indian Council of Medical Research (ICMR), New Delhi, the apex body in India for the formulation, coordination and promotion of biomedical research, is one of the oldest medical research bodies in the world. The ICMR is funded by the Government of India through the Ministry of Health & Family Welfare. The Council's research priorities coincide with the national health priorities. In the context of the changing public health scene, research has been intensified progressively on emerging health problems and developing alternative strategies for health care delivery. Attempts have been made to strengthen and streamline Medical Informatics and Communication to meet the growing demands and needs of the biomedical community. Over the decades, the base of extramural research and also its strategies have been expanded by the Council.

2. ONE WORLD SOUTH ASIA (OWSA)

In 1999, One World South Asia (OWSA) was set up in India to further One World International Foundation's (OWIF, U.K) mission in South Asia. The network expanded to include many more partners from different states in India, Pakistan, Bangladesh, Nepal, Pakistan, Sri Lanka and Maldives. OWSA's areas of work include grass roots communication, knowledge for development, research and analysis, policy advocacy and capacity building. The 5th annual general meeting saw a discussion of health care and ICT initiatives with recommendations for ICTs in government health systems at different levels to improve access and delivery of health services:

3. M.S. Swaminathan Research Foundation (MSSRF) - INDIA

M. S. Swaminathan Research Foundation (MSSRF) is a non-profit Trust whose mandate is to harness science and technology for environmentally sustainable and socially equitable development in rural areas. MSSRF conducts research in the field of Information, Education and Communication and has collaborated with PAN in a project titled "Impact of ICTs in rural areas."

4. Indira Gandhi Institute of Development Research (IGIDR) - INDIA

The Indira Gandhi Institute of Development Research (IGIDR) is an advanced research institute established by the Reserve Bank of India for carrying out research on development issues (in its economic, technological, social, political and ecological aspects) from a multi-disciplinary point of views; to gain insights into the process of development and alternative policy options and to disseminate the knowledge so gained. The Institute shall also serve as a centre for promoting co-operative endeavor and interaction in research activities between Indian scholars and institutions as well as between Indian and foreign scholars and institutions. The research agenda of the Institute is guided by policy concerns, by individual faculty members' research interests and by projects from national and international sponsors.

5. National Institute of Science Technology and Development Studies (NISTADS) - INDIA

National Institute of Science, Technology and Development Studies, New Delhi is devoted to a study of various aspects of interaction among science, society and state. Nistads is one of the 38 institutes/laboratories of the Government of India's Council of Scientific and Industrial Research (CSIR), New Delhi. The research activity of the institute can be grouped under the following broad programs

- **IPR**: IPR & development studies
- **ITBT**: Information technology and biotechnology: Policy matters and ethical concerns
- **InnP**: Innovation policy
- **INKS**: Innovation & knowledge society
- **TIARA**: Technology & integrated assistance to rural artisans
- **SD**: Sustainable development
- **STEVS**: Science-technology-education valuation studies
- **HPS**: History & philosophy of science / Public awareness of science

6. Indian Association of e-Healthcare

The Indian Association of e-Health Care, established in February 2006 as the Indian Telemedicine Association, is a non-profit making company limited by guarantee and governed by a Board of Trustees. It was formed to represent organisations and individuals interested in the development of e-Health in the India. The Association aims to become the national body promoting e-Health by:

- Promoting e-Health research and education
- Promoting the development of e-Health policy and standards
- Encouraging the adoption of uniform standards and practice
- Ensuring the recognition by authorities of the need to protect the intellectual property right developed in the industry
- Interacting with e-Health and related associations in other countries

- Public relations, publishing member best practice applications, media interviews, magazine editorial

7. Indian Space Research Organization - (ISRO)

Government of India set up Space Commission and Department of Space (DOS) in June 1972. The Indian Space Research Organization (ISRO) under DOS executes Space programme through its establishments located in different places in India. Although the prime objective of ISRO is to develop space technology and its application to various national tasks, the ISRO has signed a memorandum of understanding with four specialty hospitals namely, Manipal Hospital in Bangalore, Sir Ganga Ram Hospital in New Delhi, Madras Diabetic Research Foundation in Chennai and Dr. Venkatrao Dawle Medical Foundation at Ambajogai in Maharashtra, to expand its telemedicine network. ISRO's satellite-based telemedicine network, which started in 2001 on an experimental basis, is aimed at linking remote and rural hospitals with super-specialty facilities in major cities via INSAT.

The Government has already initiated a project called 'Development of Telemedicine Technology' under the Ministry of Information Technology. This project aims to link three tertiary level hospitals in North India, namely the All India Institute of Medical Sciences (New Delhi), Post Graduate Institute of Medical Education and Research, or Nehru Hospital (Chandigarh), and Sanjay Gandhi Post Graduate Institute of Medical Sciences (Lucknow) first tele-medicine centre in Aragonda village of Andhra Prades-h by the Apollo Hospital, Chennai on March 24, 2000. Advocates of tele-medicine believe that 'remote diagnosis' through the satellite or Internet is a boon for the 620 million living in rural India.

NEPAL

1. Environment and Public Health Organization (ENPHO)

Established in 1990, with the support of DiSvi - International Cooperation – an Italian NGO, ENPHO carries the vision of research, development and information dissemination for action. The community development division of ENPHO has been conducting diverse events and programs with coordination of different institutions. The program is planned to function at three levels, community health education, mass communication, demonstrations and school health education.

2. Royal Nepal Academy of Science and Technology (RONSAT)

Royal Nepal Academy of Science and Technology (RONAST) is an independent apex body established in 1982 to promote development of science and technology in the country. The Academy is entrusted with four major objectives: advancement of science and technology for all-round development of the nation; preservation and further modernization of indigenous technologies; promotion of research in science and technology; and identification and facilitation of appropriate technology transfer.

3. HealthNet Nepal

HealthNet Nepal is a non-governmental organization (NGO) that serves the Nepalese health community by providing affordable Internet service, access to health information, and technical

support for several regional information-sharing initiatives. HealthNet Nepal is housed at the Health Learning Materials Centre (HLMC) of the Institute of Medicine at Tribhuvan University (IOM), and affiliated with the Institutes of Medicine and Engineering. HealthNet Nepal is responsible for introducing many health organizations throughout Nepal to the power of information and communication technology, particularly electronic mail. The rapid evolution of technology and the ever-increasing needs and demands of its users are compelling HealthNet Nepal to undertake another round of technical expansion. In particular, HealthNet Nepal seeks to add the following to its roster of services: a locally-based Web site with on-line health information relevant to Nepal, video conferencing, expanded distance education services on-line access to ongoing research projects related to health in Nepal, e-fax.

4. Research and Education Network Nepal

RENN was established under the administration of the Institute of Engineering to cater national and international collaborations for facilitating research and educational developments and to meet the growing needs of academic and research community in Nepal. It is a non-commercial network.

5. International Centre for Integrated Mountain Development (ICIMOD)

ICIMOD, is the first international organisation to make a commitment to improve the living conditions of mountain inhabitants in a sustainable way, helping them to live and not merely exist upon the highest wonders on earth. The Centre is multidisciplinary, area-focused and mountain-based. Founded in 1983, ICIMOD is based in Kathmandu, Nepal, and serves eight regional member countries of the Hindu Kush-Himalayan area – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan – and the global mountain community.

SRILANKA

1. National Science Foundation (NSF)

The National Science Foundation is a state funded organization, established in 1998 as successor to the Natural Resources Energy and Science Authority (NARESA) of Sri Lanka established in 1981 and the National Science Council set up in 1968. It functions under the Ministry of Science and Technology. Its objectives is to initiate, facilitate and support basic and applied scientific research by universities, science and technology institutions and other relevant state and private sector institutions with a view to:

  a. Strengthening scientific research potential, including research in the social sciences, and scientific education programs;
  b. Developing the natural resources of Sri Lanka;
  c. Promoting the welfare of the people of Sri Lanka; and
  d. Training research personnel in science and technology;

It serves as the national focal point for the collection and dissemination of Science and Technology (S&T) information through the Sri Lanka Scientific & Technical Information Centre (SLSTIC). Promotes international contacts and serves as the national focal point for many overseas bodies, such as Association for Science Cooperation in Asia (ASCA), Association of Asian Social Science Research Councils (AASSREC), Committee for S&T in Developing

Countries (COSTED), Commonwealth Science Council (CSC), South Asian Association for Regional Cooperation (SAARC), etc.

2. Arthur C. Clarke Centre for Modern Technologies (ACCIMT)

This Institute was established in 1984 under the name Arthur C. Clarke Centre for Modern Technologies by an act of parliament to accelerate the process of introduction and development of modern technologies in the fields of Computer, Electronics, and Space through the provision of training and research facilities. ACCIMT states it will endeavor to improve quality of life of the people with the help of Modern Technologies through industry-Institute partnerships, research and development, enhancing technological know-how in related areas, Continuing Professional Development (CPD) activities, inputs for industrial development and educational reforms, and enhancing the image of the institute through collaborations globally, in scientific advancements.

3. MECAT Medical Research Institute Sri Lanka

Dr. C.M.B. Viraj Perera, Founder & Director.

FIJI

1. National Health Research Council

The National Health Research Council (NHRC) resumed its functions in 1998 after a lapse of several years. The National Health Research Committee of the NHRC comprises a Finance committee and an Ethics committee. The Councils goals are to:

- Develop and implement a national health research policy
- Foster training and retention of those engaged in health research in Fiji
- Initiate and support health research
- Promote and disseminate the results of health research
- Enhance the quality of health research in Fiji
- Ensure that opportunities for commercial development arising from health research are recognized.
- Collaborate with complementary research organizations in the country and the region towards enhancing health research.

PAKISTAN

1. Pakistan Medical Research Council

The Pakistan Medical Research Council (PMRC) was created under a resolution in 1962 on the recommendation of the Medical Reforms Commission as an autonomous organization under the Federal Ministry of Health (MoH), with the mandate to promote, organize and coordinate medical research in Pakistan. The main objectives of the Council are to:

- Organize, coordinate and promote scientific research in various disciplines of medical sciences and public health

- Link health research to the socio-economic development plans of the country.
- Advise the Federal and Provincial governments on all matters related to medical research and health issues.

The Council has in recent years established links with international health research organizations like the Commission on Health Research for Development (COHRED), the Global Forum for Health Research, the Alliance on Health research for Policy and WHO.

2. Preston Institute of Management, Science and Technology (PIMSAT)

The Preston Institute of Management, Science and Technology (PIMSAT) in Karachi, Pakistan, initially committed to improving the quality of technical and business education in Pakistan, is now in the process of adding telemedicine to its commitment. They have set up a computer-based telecommunication system at the Institute which links healthcare professionals in several rural and remote communities. They hope this will improve quality of life in the business sector and health sector as well.

The Institute believes that accurate health information and diagnostic service in underserved and rural areas are critical in Pakistan. The Centre, which is supported by the Pakistan Federal Minister of Higher Education, will serve various purposes among which will be the training of health workers and professionals about how they can use information technology to share their experiences on what methods have succeeded in preventive health. These trained practitioners can then redistribute the information on how to prevent epidemics such as AIDS, malaria, and tuberculosis and how to improve sanitary conditions.

3. eHealth Services Private Ltd

eHealth Services Private Limited is the first company in Pakistan which is offering a total solution for establishing a Telemedicine and eHealth environment, including professional consultancy for starting Turnkey solutions, video conferencing services, software and hardware provision and human resource training and development. eHealth services offers to establish Telemedicine, eHealth and videoconferencing projects with professional technical support in all major cities of the country. eHealth Services runs Telemedicine Clinic which offer Teleconsultation, both store & Forward and Real Time, establishing a link between patients and doctors who are geographically separated. This is the first such initiative in the country which is connected with Hospitals and Consultants all over the world for better patient care using state of the art technology.A separate project on TeleHome Care is going to be started soon where patients who will be present at their own homes will be monitored by Doctors and other medical staff in hospitals and clinics.

4. Pakistan Education and Research Network (PERN)

Pakistan Education and Research Network (PERN) is part of the overall vision and objectives of IT Action Plan that was launched by Prof. Dr. Atta-ur-Rahman as Minister of Science and Technology. The project is financed by the Government of Pakistan in cooperation with PTCL (Pakistan Telecommunication Company Limited) Research and Development funds. The network is designed, operated, and maintained by NTC (National Telecommunication Corporation). The project is aimed to be an integral part of the overall Education System of the country and is designed to interlink all Public / Private Sector Chartered Universities / Degree awarding Institutes registered with Higher Education Commission, Government of Pakistan. PERN serves

as a nationwide educational intranet connecting premiere educational and research institutions of the country. PERN focuses on collaborative research, knowledge sharing, resource sharing, and distance learning by connecting people through the use of Intranet and Internet resources.

5. Khyber Medical College

Khyber Medical College established in 1955, is affiliated to Peshawar University permanently and is recognized by Pakistan Medical & Dental Council, General Medical Council of England, Ireland & Licencing authority of USA. Research, being an integral part of teaching institution, Pakistan Medical Research Council has established a Research Cell in the College which is equipped with modern diagnostic equipment and qualified staff. This Cell provides research facilities to the teaching staff and helps in completion of projects of postgraduate students of basic subjects. Maternal & Child Health, Health Systems Research & Community Health are some areas of their research specialization.

AFGHANISTAN

Following the events of 11 September 2001 a number of researchers and research institutes renewed their interest in Afghanistan or expanded the scope of their activity to include peace building issues. Of these the Afghan Research and Evaluation Unit (AREU) is the only Afghan based one, though others have researchers on more permanent assignments in Afghanistan.

1. Afghanistan Research and Evaluation Unit (AREU)

The Afghanistan Research and Evaluation Unit (AREU) is an independent research organization whose mission is to conduct and facilitate action-oriented research and learning that informs and influences policy and practice. AREU also actively promotes a culture of research and learning by strengthening analytical capacity in Afghanistan and creating opportunities for analysis, thought and debate. Fundamental to AREU's vision is that its work should improve Afghan lives.

2. Loma Linda Medical Research Center at Kabul University

A new medical research center, run by Loma Linda University, California, was opened at the Kabul University medical school, on July 4. The Loma Linda center is designed to help rebuild the teaching program at the medical school.

INDONESIA

1. Airlangga University

Established in 1948, Airlangga University has become an independent, innovative, and foremost University both regionally and globally, a forerunner of science development, technology, humanities and arts. The Research Institutions of Airlangga University are established based on a Presidential decree of Indonesia. The Mission of the Research Institutions of Airlangga University is to conduct research that is oriented toward scientific and technology development that is based on main scientific model of Airlangga University with the theme: Develop the human resources and environment by developing the life and social science. The mission of these institutions is to produce research products which are;

- suitable with the development priority needs; health development, economic and cultural development. in the field of basic research, practical research, and policy research.
- the quality will be improved continuously to be step a head in local, national, and global level.

2. Padjadjaran University

The Padjadjaran University was established in 1957, and now has developed to become one of the leading higher educational institutions in Indonesia. The Health Research Unit under the Faculty of Medicine at the University conducts extensive research studies especially in reproductive medicine, traditional medicine and environmental medicine. The unit strives to apply the results of basic and new applied researches that are useful for increasing the healthy of individual and community.

3. National Institute of Health Research and Development

By ministerial decree, the National Institute of Health Research and Development (NIHRD) is obliged to provide guidance for research and development activities within the scope of the MOH. Important research outcomes have been reported and utilized where relevant in the areas of communicable diseases, anaemia, vitamin A fortification, IDD, protein-energy malnutrition (PEM), national health policy research, etc. Actions taken to develop health research and technology include priority setting in research, improving research communication, capacity building (training, career structures, research facilities), mobilizing resources, and utilization of research results. The development of SURKESNAS (a district version of the national health survey) is a priority area in the National Institute for Health Research and Development and various techniques developed by WHO HQ relating to surveys for Health System Performance Assessment (World Health Survey) are being used to strengthen and revise the use of health surveys in Indonesia.

MALAYSIA

1. Institute for Medical Research (IMR)

The Institute for Medical Research (IMR) in Kuala Lampur founded in 1900, is the research arm of the Ministry of Health Malaysia. It has chalked up many remarkable achievements in its 106 years of existence. The IMR now has six research and two support Centers. Its mission is to promote and conduct quality research directed at solving the health problems of the country, and to provide consultative services to health providers, managers and planners in improving the health of the Malaysian population.

2. Malaysian Health Informatics Association (MHIA)

The Malaysian Health Informatics Association (MHIA) is a nonprofit organization consisting of healthcare and IT professionals, institutions, and corporations dedicated to enhancing the development and innovation of health informatics, and increasing the utilization of Information Technology to improve Malaysian healthcare services and outcomes. MHIA collaborates with international health informatics organizations, authorities and academic institutions in enhancing local IT development in healthcare through participations in international conferences, meetings and paper presentations. MHIA also serves an advisory role to Malaysian healthcare stakeholders in the adoption, policy development, innovation in health informatics and e-Health.

3. The Malaysian Nstitute Of Microelectronic System (MIMOS)

MIMOS was established in 1985 and is one of the agencies under the Ministry of Science, Technology and Innovation (MOSTI). It is a leading, Government-owned, Research & Development (R&D) organization specializing in the areas of Information & Communication Technology (ICT) and Microelectronics. MIMOS pursues exploratory and industry-driven R&D through smart partnerships with universities, research institutes, Government organizations and other industry leaders.

THAILAND

1. The Institute of Health Research, Chulalongkorn University

The Institute of Health Research was established by Royal Decree in Chulalongkorn University IN 1974 so as to facilitate studies and research in the field of health. The Institute operates independently and conducts multidisciplinary research. It is also a centre of collaboration, both for outside agencies and the university's other academic branches involved in health research. The Institute also organizes training sessions and seminars and provides instruction on research methods to lecturers, graduate students and researchers from the University and to personnel from other related foreign and local agencies. It also offers advice and provides academic services in planning and research operations, data collection, and computer analysis of data. It also takes an active role in dissemination of research findings and current research procedures to related government agencies and the general public.

2. ASEAN Institute for Health Development (AIHD)

The ASEAN Institute for Health Development (AIHD) was originally established in 1982 as the ASEAN Training Centre for Primary Health Care Development (ATC/PHC) and was renamed in 1988. As an institute the organization has continued to promote Primary Health Care through participatory community-based development. The AIHD has furthermore played an increasingly important role in promoting multilateral cooperation with other international agencies to carry out training, research, and documentation projects in the areas of primary health care and participatory community-based development. During the last decade the AIHD has made a conscious effort to increase its activities to include HIV/AIDS in Thailand and neighboring countries. The AIHD is currently in the process of completing several projects in this field.

3. Thai Health Promotion Foundation

The Thai Health Promotion Foundation, or ThaiHealth, was established by the Health Promotion Foundation Act in 2001, Its objectives include the reduction of sickness and death, and general improvements in quality of life. ThaiHealth aims to support, rather than replace, groups and organizations that are already working on public health issues. The 'Health Promotion through Health Care Delivery System' plan aims to reorient the government health care system towards health promotion, rather than just treatment. It includes changes in management systems, the enhancement of community participation, adjustment to local conditions, and increased emphasis on health promotion during medical training.

Activities

1. Promote and expand hospital accreditation, with increased emphasis on health promotion and prevention services
2. Enhance health promotion capacity of health service providers and administrators
3. Support the development of networks for health promotion
4. Support research on creating a more active health service system
5. Support the development of an emergency health service system.

SINGAPORE

1. Yong Loo Lin School of Medicine

The Yong Loo Lin School of Medicine was the first academic body in Singapore's history dedicated to tertiary education. Established in 1905, it has the honor of being the foundation of what has now evolved into the National University of Singapore. It is engaged in educating the current and future generations of doctors and discovering new knowledge through scientific research for the health and well being of the community at large. The Health Services Research Unit at the Department of Community, Occupational and Family Medicine has a focus on critical health policy and evaluation research, with strategic thrusts in comparative health systems and health economics & financing. Staff members have actively initiated and contributed to various regional and local studies, and have maintained their collaboration with external agencies like the World Health Organization, the World Bank and ministries of health both in Singapore and abroad.

2. Agency for Science, Technology and Research (A*STAR)

A*STAR is a luminous Constellation, charting the course for Singapore's Science and Technology. It comprises the Biomedical Research Council (BMRC), the Science and Engineering Research Council (SERC), Exploit Technologies Pte. Ltd (ETPL), the A*STAR Graduate Academy (A*GA) and the Corporate Planning and Administration Division (CPAD). Both BMRC and SERC promote, support and oversee the public sector R&D research activities in Singapore. Both Councils fund the A*STAR public research institutes which conduct cutting-edge research in specific niche areas in Science, Engineering and Biomedical Science.

3. Singapore Advanced Research and Education Network (SingAREN)

Singapore Advanced Research and Education Network (SingAREN) started as a national project funded by the government in 1997 to take on the challenge of ensuring that Singapore research and education (R&E) community is connected to the international R&E community. Being the national research and education network (REN), it has maintained network connectivity to the global Next Generation Internet (NGI) community such as Internet2 and APAN (Asia Pacific Advanced Network). SingAREN services are provided to facilitate and coordinate the development, deployment, operation and technology transfer of advanced network infrastructure for research and education and accelerate the development of next generation network-based applications and services.

4. Nanyang Technological University

Nanyang Technological University (NTU) is an established, research-intensive tertiary institution with a vision to be a global university of excellence in science and technology. Founded in 1955, they have established an international reputation and proven themselves worthy partners to 200 top universities in 37 different countries. The School of Communication and Information (SCI) at the University has become a premier research institution that generates empirical and humanistic analyses of communication topics and policy issues important to Singapore and the region. Faculty members publish their research and showcase their creative works in international journals and forums. SCI continues to establish and maintain an international network of educators, researchers, and info-comm professionals through collaborative projects, conferences and other exchanges.

5. National Medical Research Council (NMRC)

 The National Medical Research Council (NMRC) is appointed by the Minister for Health with a mandate to lead, promote, co-ordinate and fund medical research in Singapore. The NMRC is responsible for the strategy and priority setting in the national medical research. It funds medical research programs and projects; awards fellowships for medical researchers; and establishes international collaborations and inter-discipline partnerships. It also evaluates the outcomes of the research projects and facilitates the commercialization of research findings.

PHILIPPINES

1. Centre for Research and Communication (CRC)

Centre for Research and Communication (CRC) was founded in 1967 as a private, non-stock, non-profit research institution serving the needs of the business community for economic information. CRC rapidly expanded its activities enlarging its research capacity and venturing into fields such as corporate planning services, international studies, country risk analysis and education. Throughout the years, CRC has kept the tradition of balancing scholarly research and active engagement in policy debates and reforms. Taking advantage of the opportunities arising from new technologies and the advent of a borderless world to expand the scope of its mission, today's CRC continues to follow this tradition of harnessing knowledge for progress.

2. ISIS International, Manila

Isis International was formed in 1974, is a feminist NGO committed to creating spaces within information and communications structures and systems, that promote the many voices of women, particularly those from Asia and the Pacific South. Isis is likewise committed to challenge inequities, stereotypes and cultural and political homogenisation furthered by globalised media that hamper the realisation of a more just, sustainable and humane world.. With connections in over 150 countries, it keeps up with changing trends and analyses concerning women worldwide.

3. Department of Science and Technology (DOST)

The Department of Science and Technology (DOST) is mandated to provide central direction, leadership, and coordination of all science and technology activities in the country; and, formulate S&T policies, programs, and projects in support of national development priorities. It promotes, assists and, where appropriate, undertakes scientific and technological research and development in areas identified as vital to the country's development and undertakes policy research, technology assessment, feasibility and technical studies.

4. Philippine Council for Health Research and Development (PCHRD)

The Philippine Council for Health Research and Development (PCHRD) is one of the five sectoral councils of the Department of Science and Technology (DOST). It is a forward-looking, partnership-based national body responsible for coordinating and monitoring research activities in the country. As the focal point for health research and development (R&D) in the country, they

- provide leadership and direction in health and related R&D activities

- rationalize investment in science and technology through a system of review of ongoing and pipeline projects in the government sector, and by influencing the private sector to support and implement projects that are in consonance with the Health Science and Technology Plan

- develop and strengthen human and infrastructure resources of the health research network
- implement a research utilization program to ensure that research products are properly disseminated among and utilized by their intended users
- facilitate the identification and packaging of health technologies for adoption and commercialization by both government and private sectors
- generate additional resources for health R&D by pursuing active collaboration with local and international funding agencies

5. Multi Purpose Community Telecentres

The Multipurpose Community Telecenters (MCT) piloted in the Philippines the introduction of Information and Communications Technology (ICT) as a tool for rural development. It officially started in 1999. It serves as a one-stop information resource center for the people in the barangays, to give them access to information, people, and organizations, using simple and state-of-the-art communication tools, which can provide answers to the communities' concerns. It also acts as a venue for learning and interaction as well as for creating content and ICT-based applications, particularly on health, education, agriculture/fisheries/natural resources, and rural enterprise development, which respond to the needs of the communities. MCT envisions provision of telehealth/e-health services, distance education/e-learning tools, and on-line marketing access to the rural communities.

VIETNAM

1. Institute of Information Technology

The Information Technology Institute (ITI) was established in 2001 on the basis of reorganizing Vietnam Information Technology Training Institute (VITTI). It is one of the research institutes under the Vietanam National University (VNU). Its mandate is to carry out R&D projects in the fields of information technology.

2. Vietnamese Academy of Science and Technology

3. Ministry of Science and Technology

The Ministry of Science and Technology is an agency under the Government, which fulfills State management functions in terms of science and technology activities, development of science and technology potentials; standards for quality measurement of products and goods; intellectual property, atomic energy, radiation and nuclear safety.

4. Hanoi Medical University

The Hanoi Medical University was founded in 1902. The task of masters and students of the HMU is to carry out university and post university formation, scientific research and to serve medical practice.

CAMBODIA

1. National Institute of Public Health

The National Institute of Public Health, NIPH, is a research Institute and part of the Ministry of Health in Cambodia working closely with other Institutions and Centers as well as with the Provincial Directories. The NIPH aims to become the Center of Excellence for the Cambodian Ministry of Health. Its main purpose is to give target-oriented and qualified Public Health training to key health personnel, to analyse health-related problems, to assist in developing adequate approaches through decision linked operational research and to support the implementation of the Health Care System Reform through training and research in linked Provinces. It will provide policy makers with elements to base their health care reform on sound scientific evidence, to follow the process of implementation in analysing developed strategies and compare alternative approaches taking cost-efficiency into consideration. The National Reference Laboratory gives specific support for training, research, quality control and development of standards.

2. Center for Advanced Study (CAS)

The Center for Advanced Study (CAS) was founded in 1996 as an independent, non-political Cambodian institution devoted to research, education and public debate on issues affecting the development of the Cambodian society. CAS provides research services, develops research projects, supports research capacity building, and promotes the use of evidence-based policy. The Centre uses an integrative, problem-oriented approach, and seeks to work with Cambodian and

international scholars. CAS conducts research programs designed to help clarify public policy options and develop priorities from a humane, people-centred perspective. CAS has conducted research for different national and international organizations on various subjects, among others on health and health care (including HIV/AIDS), health seeking behaviour, civil society, voter awareness, gender issues, and trafficking of women and children. CAS has extensive experience in both quantitative (country-wide surveys) and in-depth, qualitative research, and has worked with and for organizations such as The Asia Foundation (TAF), Japan International Cooperation Agency (JICA), United Nations Development Programme (UNDP), World Health Organization (WHO), Department For International Development (DFID), International Organization for Migration (IOM), World Vision International (WVI), International Labour Organization (ILO), OXFAM, Pharmaciens sans Frontiers, The Open Society Institute, and Coffey Philippines.

3. Institute of Research and Advanced Studies (IRAS)

IRAS forms one of the research institutes/centers functioning under the auspices of the University of Cambodia. The mission of the Institute of Research and Advanced Studies (IRAS) is to support research activities and other advanced study in Cambodia. IRAS will be a focal point for researchers from inside and outside Cambodia, and from inside and outside the University of Cambodia. Related to the research activities will be the dissemination and discussion of research results in the form of publications, conferences, and regional contacts.

Appendix VIII – Pragmatic Evaluation

A conceptual approach to assessment of value of proposed e-health solutions has been developed and should be published in the near future. Termed 'pragmatic evaluation' the approach respects the need for rigour, guiding and advising users on evaluation approaches at different stages of development, but limits the need for sophisticated academic research (e.g. avoiding the application of randomized controlled trials). The concept of Pragmatic Evaluation is described below.

Evaluation lies on an 'investigative continuum' between 'basic research' and 'continuous quality improvement', each of which require specific methodological and analytical approaches to ensure they are performed with rigour. Sadly, evaluation has somehow become identified as synonymous with second rate research. This not the case. Evaluation, performed well, provides sound research evidence. Evaluation has been defined as: "Attributing *value* to an intervention by **gathering** *reliable and valid information* about it in a **systematic way**, and by making comparisons, for the purposes of *making more informed decisions* or *understanding causal mechanisms* or *general principles*." [30]

The framework described in Figures 4 and 5 focuses on gathering reliable and valid information in a systematic way to provide evidence that can be used to compare interventions and make an evidence-based judgement of the value of an e-health intervention, and the future benefit of scaling and mainstreaming the proven e-health intervention.

The 'Pragmatic Evaluation' approach was developed for evaluation of telehealth initiatives by 'non-researchers', but has been found to be equally applicable to approaching evaluation of e-health initiatives. The concept was first presented at two international conferences in early 2006 [31]. Pragmatic Evaluation applies lessons from the knowledge transfer literature (CHSRF – what is the question), as well as solid evaluation approaches described above, to provide a simple and pragmatic approach to the evaluation of e-health initiatives. Pragmatic evaluation accepts the view expressed by Glover that "the aim should be to support practical, applicable research, be it theoretical or empirical, rather than applied research *per se*". It also supports IDRC's recognition that policy relevance cannot come at the price of scientific excellence, and that capacity building cannot be seen as an excuse to support work that is not credible.

Pragmatic research has four tenets:

- Ask - and answer - relevant questions

- Adopt a scientifically valid approach

- Align with existing strategies

- Get the knowledge to where it is needed

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[30] Øvretveit, J. (1998) Evaluating health interventions, London, Open University Press, pp.158-180.
[31] i) Developing an e-Health Evidence Base – Pragmatic Research. Transforming Health and Healthcare through e-Health Technologies; An e-Health Conference in collaboration with the Sahyadri Specialty Hospital, Pune, India. 11-12 March 2006; ii) 21st Century Health Care – Managing Information for Evidence-Based Decision-Making, Hosted by CIIT, Islamabad, Pakistan; 7-8th April 2006.

1. **Ask - and answer - relevant questions**

   In order for e-health solutions to be sustainable, they must be supported by governments or the business sector. In turn, for these groups to be interested in the solution it must address – ideally solve – a matter of recognized concern to them. Therefore the process must begin by identifying a policy relevant issue and end by providing a policy relevant answer [32].

   To assist in identifying policy relevant issues, Figure 4 suggests steps to the process. Each jurisdiction will typically have available information regarding existing gradients in health and healthcare of the local or national population. Using this as the starting point the most significant gradients can be identified, which are likely to represent those issues of most importance and concern – i.e. recognized policy relevant issues [33]. These issues do not simply 'exist', they arise as a result of contributing factors. Identifiying the contributing factors gives substance to understanding the underlying causes, which is where any e-health solution must have an impact. Examining these contributing factors will allow speculation about potential solutions that might impact them at the practice (healthcare provider), program (healthcare organization), or policy (healthcare system) levels.
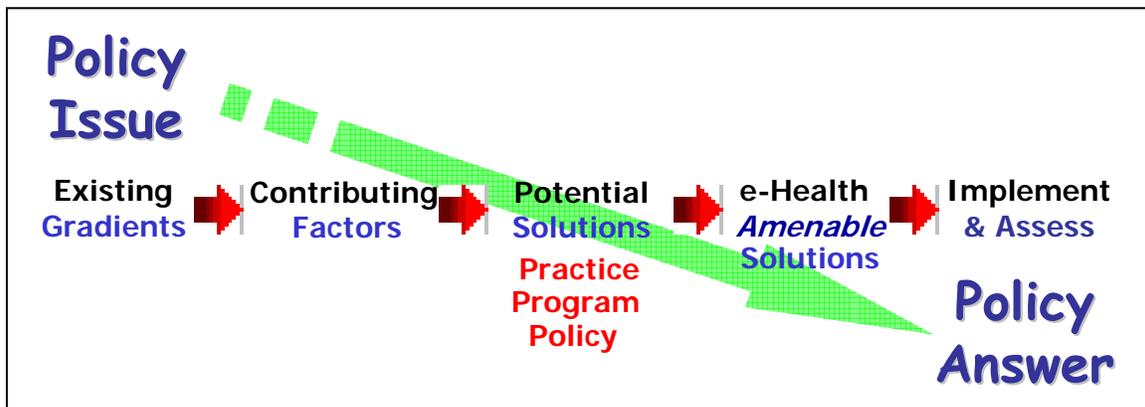

Figure 4. Steps to Identifying Policy Relevant Issues for e-Health Solutions

   Of these potential solutions, some (not all) will be amenable to intervention using an e-health mediated solution. This is a crucial step, and where avoidance of the technological imperative is essential. Many solutions do not implicitly require technological elements in order to implement them. Only those solutions that can clearly benefit from an e-health intervention (identified as 'appropriate technology') should be approached in that fashion. Once one or more e-health amenable solutions are identified, one solution must be selected (or a study designed specifically to determine the optimal approach), and a study implemented to assess the actual value and viability of the proposed solution. In this way, the answers found through the study will be policy relevant, and of interest to the government or business sector.

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[32] CHSRF. *If research is the answer, what is the question*? Key steps to turn decision-maker issues into research questions. Available at: http://www.chsrf.ca/knowledge_transfer/pdf/research_e.pdf. Last accessed 14 November 2006.

[33]   Lomas J, Fulop N, Gagnon D, Allen P. On being a good listener: Setting priorities for applied health services research. Milbank Quarterly, 2003;81(3):363-388.

2. Adopt a scientifically valid approach

The Pragmatic Research model also aligns with IDRC's recognition that policy relevance cannot come at the price of scientific excellence. Balancing this is the finding described earlier that the knowledge, skill, and experience of some 'evaluators' may not as desired. For this reason, the framework for the model (Figure 5) strives to recommend specific research approaches (literature review, case study, pre-post, or comparison study), related to the goal of the study (define / design / deploy an e-health intervention; understand the change process associated with an e-health intervention; determine the impact of the e-health intervention, and determine the outcomes of the e-health intervention). In turn, these approaches are applied at specific stages of implementation (pre-telehealth or pre-e-health, development, implementation, integration, and sustained operation). These stages are also aligned with experiences an organization will undergo as they progress (described as: routine care, disruption / transformation, routine telehealth or e-health, and again routine care).

Figure 5. Pragmatic Evaluation Framework
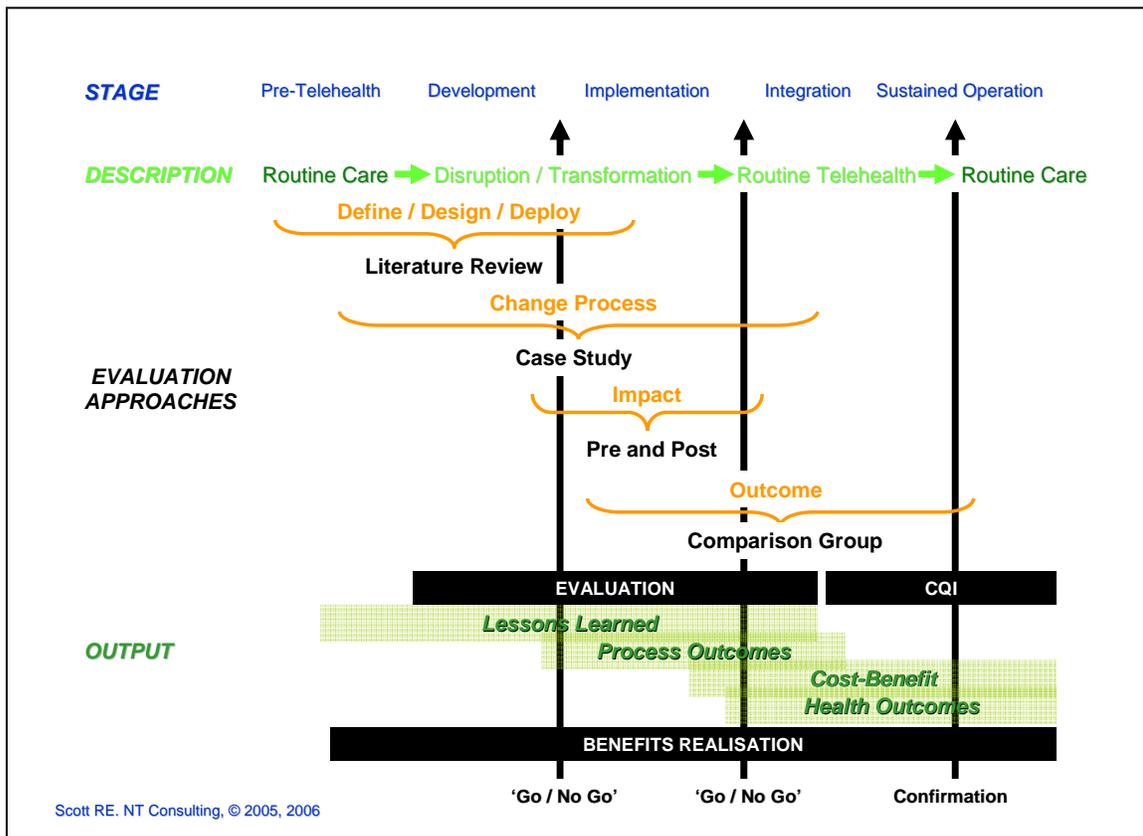
The collective output of these activities will be to provide some level of 'benefits realisation', which will be strengthened as the sophistication of the research approach progresses (from lessons learned, through process outcomes, to clear cost-benefit and health outcomes). Of importance is recognition of the need to make 'go-no go' decisions at various stages, until such time as the overall 'value' of the e-health intervention is confirmed. Finally, it is recognized that at some point the process will transition from one

of evaluation to a CQI (Continuous Quality Improvement) activity as key indicators are identified that will also function to monitor ongoing performance.

3. **Align with existing strategies**

The third tenet of Pragmatic Evaluation is recognition that as this is applied research, its greatest likelihood of success exists if it aligns with existing e-health strategies (i.e. although needed, there is no room within this model for 'investigator driven' or 'basic research'). An understanding of the current policy environment can be gained by performing a scan of e-health strategies and trends within and external to the particular jurisdiction involved.

Aligning with established (or planned) e-health strategies becomes an issue if there is no definitive e-health strategy against which to align. In such cases there is a clear need for engaging policy- and decision-makers in e-health policy debate, and a greater need for direct inclusion of policy makers in the e-health evaluation process (see below).

4. **Get the knowledge to where it is needed**

The final step in Pragmatic Research is striving to have the knowledge gained put to good use in decision- and policy-making. Known by many names (Knowledge Brokering, Knowledge Transfer, Knowledge Exchange, etc.) this is the process of bringing researchers closer together with policy- and decision-makers in government and industry sectors [34], even working as partners [35], and disseminating information to these stakeholders [36]. There is an inherent assumption in performing health services research (including applied e-health research), that the findings will be recognized and applied in making decisions concerning the adoption and application of e-health solutions in the future. This assumption is debated [37], but importance of this aspect is supported by IDRC in its recent Strategic Plan, where it is stated "Research, knowledge production, knowledge sharing, and knowledge use are essential if the global community is to build a better future for humankind".

Many principles have been espoused to achieve Knowledge Transfer [38], but the reality is -it is arduous, often grounded in personal relationships and trust building, and must begin long before development of an e-health (or any other) research proposal. Its importance however, is undeniable and demonstrated in developed countries such as Canada. Indeed, organisations such as the Canadian Health Services Research Foundation (CHSRF) dedicate themselves and their resources to promoting the 'knowledge transfer' needed to

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[34] CHSRF. Knowledge Brokering. Available at: http://www.chsrf.ca/keys/use_knowledge_e.php (last accessed 14 November 2006).

[35] CHSRF. How to be a good research partner. A guide for health-system managers and policy makers. Available at: http://www.chsrf.ca/other_documents/pdf/partner_e.pdf (last accessed 14 November 2006).

[36] CHSRF. Developing a dissemination plan. Available at: http://www.chsrf.ca/knowledge_transfer/pdf/dissemination_plan_e.pdf (last accessed 14 November 2006).

[37] Glover D. Policy Researchers and Policy Makers: Never the Twain Shall Meet? IDRC. Available at http://www.idrc.ca/books/ev-8311-201-1-DO_TOPIC.html. Last accessed: 8 November 2006.

[38] *CHSRF. Leveraging Knowledge: Tools & Strategies for Action.* Report of the 7th CHSRF Annual Invitational Workshop. Montreal, Quebec, March 3, 2005. Available at: http://www.chsrf.ca/knowledge_transfer/pdf/2005_workshop_report_e.pdf (last accessed 14 November 2006)
and;
T*ennyson R.* Managing Partnerships: Tools for mobilising the public sector, business, and civil society as partners in development.
In: Brokering Digest, Issue # 25 2006. Available at: http://www.chsrf.ca/brokering/pdf/digest_20061102_e.pdf (last accessed 14 Novemner 2006).

encourage and achieve application of research findings in evidence-based decision making and policy making.

The concept of Pragmatic Evaluation has been established within a developed country environment. As democratic governance is established and matures in developing countries, it is anticipated the same principles will apply. However, as acknowledged by IDRC, the degree of openness to critique and the contribution of research findings in the political system in some developing countries can be limited. It would be prudent for the Project Design Team to review and consider the applicability of the Pragmatic Research model and framework for PANACeA.