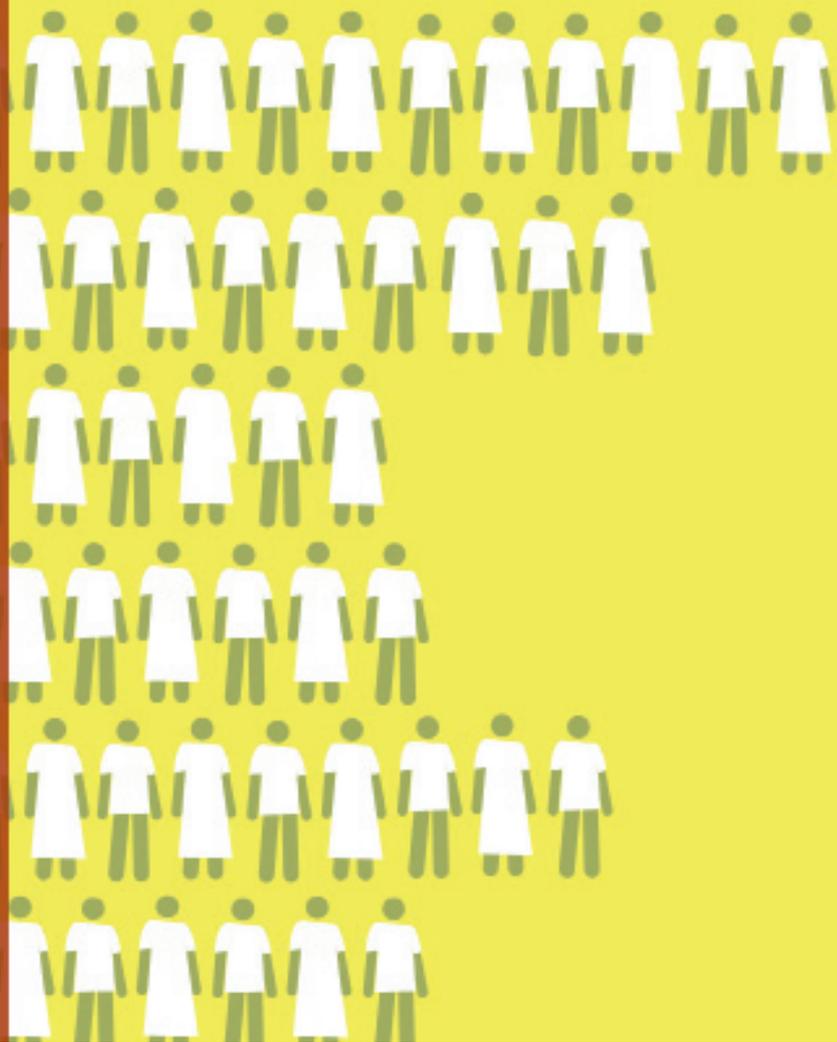


**Increasing
access to
health workers
in rural and
remote areas**

Technical Report N°2



**OUTREACH SERVICES AS A
STRATEGY TO INCREASE
ACCESS TO HEALTH WORKERS
IN REMOTE AND RURAL AREAS**



**World Health
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OUTREACH SERVICES AS A STRATEGY TO INCREASE ACCESS TO HEALTH WORKERS IN REMOTE AND RURAL AREAS

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LIST OF ABBREVIATIONS

FHI	Family Health International
GP	general practitioner
HRH	human resources for health
ICT	information and communication technology
IDRC	International Development Research Centre
IHF	Interntional Hospital Federation
ISfTeH	International Society for Telemedicine and eHealth
OECD	Organisation for Economic Co-operation and Development
PEPFAR	United States President's Emergency Plan for AIDS Relief
RAFT	Francophone Africa Telemedicine Network
WHO	World Health Organization

PREFACE

Policy-makers in every country are faced with the significant challenge of meeting the health needs of their populations, including those vulnerable communities in remote and rural areas. In order to ensure the equitable delivery of health services in these areas, skilled and motivated health workers need to be in the right place at the right time.

Following various international calls for action from global leaders, civil society and Member States, in February 2009 the WHO launched a programme to increase access to health workers in remote and rural areas through improved retention. This programme was developed in order to support countries to address the critical issues of retention and equitable distribution of health workers.

The programme consists of three strategic pillars:

- Building and sharing the evidence base
- Supporting countries in the analysis, evaluation and implementation of effective strategies
- Producing and disseminating policy recommendations and guidelines.

Substantial work has gone into expanding the evidence base on retention strategies and developing the global recommendations. At the launch of the programme, the expert group convened by WHO to develop evidence-based recommendations in this field identified the key evidence gaps in this domain. Subsequently, additional systematic reviews of the evidence have been commissioned by WHO to fill these gaps. In addition, a series of country case studies have also been commissioned, following a common template developed by the expert group, to better understand the importance of context and the way different countries have approached the issue of rural retention of health workers.

This report presents an overview of outreach services provided by health workers to remote and rural populations in different countries and contexts. It aims to highlight the potential for these alternative health service delivery models, such as mobile clinics and telemedicine, to enhance the attraction and retention of health workers in underserved areas and encourages further evaluations to be conducted in this area.

The authors stipulate that not only can the various different forms of outreach services improve access to health care, but they can be key in decreasing the sense of isolation felt by those health workers who are posted in hard to reach areas and provide key professional support. Indeed, outreach services can be a valuable addition in the “bundling” of retention strategies and should be explored further as part of innovative approaches to attract and retain health workers in remote and rural areas.



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1 INTRODUCTION

The challenge of access to human resources for health (HRH) has not lost any of its importance since the publication of *The world health report 2006* (1). Shortages of health workers, uneven distribution, brain drain, etc. are still current problems in both developing and developed countries, affecting the equitable access of the population to health care. Beyond a general trend, it is important to bear in mind that situations differ within countries and across borders, calling for customized solutions: because of the gravity of the situation, no option should be discarded. This is why it is important to explore a wide variety of initiatives that can contribute to increasing access to preventive, diagnostic and treatment services, particularly in remote and rural areas where health workers are often lacking. It is also important to stress that such solutions should be long lasting and contribute to the overall retention of health workers serving communities.

This review was commissioned as part of the World Health Organization (WHO) programme *Increasing access to health workers in remote and rural areas through improved retention*,¹ the objective of which is to focus on strategies that enhance the attraction of health workers to underserved areas and their retention there. Although service delivery is a much broader subject than the one of health workforce retention, it is important to keep it in mind in the present context.

Health service delivery models play a significant role in access to health workers. The aim of this report is not to review all such models, but to focus on outreach services as a means to enhance health workers' attraction to and retention in underserved areas. Populations must be able to receive support from permanent community-based health workers, but – according to the nature of care, the distribution of personnel and issues of physical access – it is also important to consider alternatives, especially in remote areas.

Outreach services are one of the possibilities to enhance access to health workers and to improve overall retention at country level. Better mobilization of urban health workers to serve remote or underserved areas is a strategy to improve access to health to the population in remote and rural areas. This collection of case-studies² illustrates different physical or technology-based strategies that mobilize health workers from hospitals for outreach services.

These services would complement programmes that promote the permanent posting of health workers in remote areas. For example, well-organized rotations can provide continuous access to health workers, as well as continuity of care for underserved populations. A part of the

health workforce that may not be attracted by permanent relocation may be very interested in serving in remote areas for short periods of time on a long-term basis.

There is some emphasis on the service delivery model, because beyond individual motivation factors, the enabling conditions can affect the availability of health workers. The sustainability of solutions to provide permanent access to HRH is also related to the overall organization of the service delivery model.

The case-studies show that it is possible to sustain health services to the population by a combination of approaches. Strategies such as mobile clinics, health caravans, telemedicine and, more recently, telephone-based strategies are examined for their capacity to support population health and front-line community health workers.

Because most of the studies reviewed only describe the services offered to the population, it is not possible to analyse fully the impact of the service delivery models on the actual mobilization of the health workforce. From available information, it is difficult to measure how attractive these strategies are for health workers. In addition, because the focus is on service delivery, little attention has been paid to human resource management issues. However, even with limited evidence the case-studies provide enough information to deduce policy options to enhance access to health workers in underserved areas.

A wide variety of players can provide outreach services: hospitals or health institutions, professional boards, private companies, nongovernmental organizations or government agencies. The categories of health professionals involved vary from one strategy to another, and modalities to mobilize them also differ (voluntary service, financial incentives, etc.). Compiling this information in one document provides policy-makers with ways to address the imbalance between adequately served (or even over-served) areas and those where populations have major difficulties in accessing care.

It is important to clarify what is meant by “outreach services”. In this study, the term is used to describe any type of health service that mobilizes health workers to provide services to the population or to other health workers, away from the location where they usually work and live. Outreach services can be organized on a permanent basis with health workers hired to serve in remote places according to a set schedule. Outreach services can result from a voluntary or a mandatory approach. When mandatory, the activities would be part of the health worker's job description and fully acknowledged in his/her activity report. Outreach services could also be included in the health system's service delivery options and should therefore be fully supported to ensure success.

¹ http://www.who.int/hrh/migration/retention_flyer/en/index.html

² There are seven case-studies in the Annexes. The complete research, which spans 19 such studies, is available at: <http://www.ihf-fih.org>

In support of front-line workers, outreach services enhance their capacity and the scope of their activities, thus allowing the population access to broader services without having to seek another source of care.

This report aims to engage policy-makers to adopt innovative approaches to attract and retain health professionals in underserved areas. It also shows that mobilizing health workers is related to health system components; measures for the better use of health workers can derive from broader policy options on health financing, human resources management and modalities to organize service delivery. To face the current HRH crisis, solutions must be found beyond the HRH specialist élite by getting decision-makers on board, despite their other preoccupations. In the context of primary health-care renewal, access to health care is a priority: service delivery has therefore to be re-thought not only to prioritize the most cost-effective health services, but also to engage all health workers to deliver essential health services to everyone, regardless of residency.

Solutions exist to improve the equity of access to care, but it is clear that situations are more difficult in some places than others and that poverty remains a major factor in limiting progress. However, even in a resource-constrained setting, it is important to offer populations a range of services whose scope responds to their health needs. For example, community health workers can distribute medicine against river blindness and mobile teams can perform cataract surgeries (2). This report advocates an approach that enhances both access to and retention of health workers.

As mentioned above, the paucity of published information has constrained the ambition of this review. A large part of the report describes the modalities of organization of outreach services and the expected benefits in terms of health outputs. The consequences of the organization of outreach services are mentioned where possible, but it would be necessary to go beyond this initial stocktaking approach.

2. SCOPE OF WORK

Learning from experience is the best way to understand what works and what does not. It is important not to limit investigations to low-income countries, because underserved areas can be found all over the world and all face similar difficulties in attracting and retaining health professionals. Levels of resources and development determine the adoption of a specific delivery model, but limited resources do not entail investigation of all options to support front-line health workers. It is therefore possible to learn from experiences throughout the world.

Effective management of front-line workers through support and supervision plays a role in enhancing the delivery of health services. Because this work does not intend to cover every aspect of service delivery, this point

will not be studied. Similarly, institutional arrangements such as contracting, which can enhance the utilization of health workers, call for specific research beyond the scope of this report.

Outreach activities may also need to be supported by a large number of stakeholders, but when experimented on a limited scale, they can be decided locally with the resources available. In addition, as outreach services have been operating for decades, it makes sense to start by looking at previous experience.

2.1 DIFFERENT APPROACHES TO BRING HEALTH WORKERS TO POPULATIONS

Two main outreach strategies are presented: physical and virtual, both of which rely on the involvement of health workers from better-served areas. For physical strategies, health workers have to go to the field to provide services. When outreach services rely on virtual strategies (e.g. telemedicine) health workers can run the services without moving from their workplace. In both cases, health workers must dedicate a portion of their time to serve front-line workers and underserved populations. Outreach activities can be considered as a modality of service delivery for any type of service to any type of population; the focus here is on rural and remote areas.

2.1.1 Involving front-line human resources more effectively

Health professionals practising in well-served areas in secondary-level or tertiary-level facilities can support their colleagues working on the front line, but also serve the population directly. Physical outreach strategies can include remote day consultations, rotation in health structures, and mobile clinics. There is a large variety of mobile clinic approaches that cover either dedicated pathologies with specialized teams or periodic interventions of multidisciplinary teams. In all cases, the mobile clinic concept links health workers' competencies with the minimal practice environment in which to perform.

When health workers have to leave their current functions to go into the field, their absences must be carefully planned to avoid disruption of services and excessive workloads.

Experiences described in the annexes show that different kinds of incentives can motivate hospital staff to participate in outreach activities. Incentives can be financial, social or professional or a combination of the three; in approaches that rely on volunteers, incentives are mostly related to spiritual motivation.

All categories of health workers are involved in outreach activities: general practitioners (GPs) or specialists, allied professions (such as nurses, midwives and physiotherapists), technical staff, etc. The way health workers are mobilized is very much related to the nature of the initiative behind the outreach programme.

In countries where the outreach activities are part of the services provided by the public facilities, health workers are expected to perform them as part of their job. In some countries, this can be considered as mandatory service, especially for newly hired civil servants. Outreach programmes are often not operating in the public sector because funds are not available to finance commuting expenses. In facilities that are mostly funded through cost recovery, the absence of earmarked funds for outreach activities is a major limitation. These facilities will be tempted to favour only inpatient and outpatient activities that generate resources to cover their running costs. When these activities are well funded, and especially when there is a specific financial incentive linked to effective delivery of outreach services, health workers perform them without difficulty. For some health workers, having the possibility to participate in outreach activities is even considered as an added value that increases professional interest.

For initiatives supported by nongovernmental organizations, health worker recruitment relies on several factors. First and foremost, a personal interest linked to professional development or spiritual motivation is behind initial participation. Success factors for sustainable HRH participation in such programmes are flexible employment arrangements that allow health workers to participate in outreach activities and good logistic organization of their displacement.

2.1.2 Mobilizing technology for remote support

“eHealth” is defined as the use, in the health sector, of digital data – transmitted, stored and retrieved electronically – in support of health care, both at the local site and at a distance.³ eHealth is an indispensable component of the services that health systems can offer for prevention, diagnosis and treatment. New technologies to support front-line health professionals and the population have been developed to respond to various contemporary challenges in a context of social and economic change.

The recurrent difficulty when dealing with new technologies in developing countries is a lack of infrastructure. However, eHealth does not rely solely on sophisticated technologies: simple ones that do not require substantial technical capacity can be used to make significant improvements. Because eHealth already covers a large scope of activities, it is important to distinguish between virtual approaches to provide direct service to patients (patient-centred health services) and those dedicated to direct health-care provision (telemedicine). As listed below, it is possible to find a certain number of services in these two categories.

Patient-centred health services include all the approaches used to follow and connect patients directly with health professionals.

- *Electronic patient records.* These are tools to help register and manage patient health history, such as bedside electronic medication matching, automated

alerts and reminders, electronic patient surveillance, and computerized physician order entry (CPOE). They enable easy communication of patient data between different health professionals (GPs, specialists, nurses, pharmacists, etc.) and include all types of physical and psychological measurements that do not require a patient to travel to a specialist (tele-monitoring).

- *Electronic patient information.* The patient is informed instantly about health topics. This is a good information tool, enhancing health education.

Telemedicine is an alternative to direct health-care provision. It reduces the difficulties of access to health services by providing links between patients at the contact point and the medical expertise, wherever it may be. Several tools have been developed to support more comprehensive care at the point of contact with the patient.

- *Medical imaging* (eRadiology, eEchography, etc.). This technology offers a real opportunity to improve the health of populations by providing access to imaging diagnosis. It has an impact on health outcomes, especially for injuries and maternal health – two of the top 10 causes of deaths worldwide (3). Of course, use of imaging technology is limited by the availability of equipment and the ability to use it. Some devices are now quite affordable and easy to use, although the challenge remains to mobilize the competencies needed for interpretation. This can be provided by staff working in large urban centres.
- *Diagnosis and treatment support.* Health professionals do not always know how to deal with complex clinical cases. Bringing experts closer to front-line health professionals for a second clinical opinion and advice via teleconference, audio and e-mail improves the quality of care and shortens patients’ waiting time.
- *Tele-consultation.* This diagnostic and treatment device serves patients directly through distance care via a virtual clinic (4, 5). This does not replace a physical visit to a GP, but can be an alternative for primary health care in remote areas. Through the use of self-examination devices and a teleconference, the patient is given advice by a GP at distance, who has an overview of the seriousness of the disease and is able to respond quickly. This quick response can significantly improve the health outcomes while averting the costs incurred by late treatment.

Nowadays, information and communication technology (ICT) connects people easily and fast around the world through satellite communication, the Internet, mobile telephones and computers. These tools can be used to deliver health services. Of the 360 million people in Latin America and the Caribbean who live on less than US\$ 300 a month, according to the Inter-American Development Bank’s Opportunities for the Majority Initiative,⁴ 160 million are mobile telephone subscribers (6). This level of mobile telephone use provides a real opportunity to access health

³ <http://www.who.int/eht/eHealthHCD/en/index.html>

⁴ <http://www.iadb.org/en/topics/opportunities-for-the-majority/opportunities-for-the-majority,1377.html>

care, supporting both health professionals (for discussions about clinical cases with faraway experts, e-Radiology, etc.) and the population in remote areas (for the follow-up of patients, provision of health education and information, etc.).

For all international organizations, ICT promises access, quality and cost-saving in health care, but up-to-date applications in health have been limited.

Implementation is supported by nongovernmental organizations such as the International Society for Telemedicine and eHealth (ISfTeH), which disseminates knowledge and experiences on telemedicine and eHealth. In many developed countries, initiatives led by government agencies are promoting a more extensive use of the various eHealth-related technologies. In 2005, WHO Member States adopted resolution WHA58.28 to implement eHealth strategies (7). In the same year, the former President of India launched the Pan African e-Network. With a budget of US\$ 117.7 million to support the infrastructure, training and operations over a five-year period,⁵ the network aims to connect all African countries by satellite and fibre optic links to provide telemedicine, Internet access, videoconferencing and voice-over-Internet protocol (VOIP) services. Coordinated by the African Union, this initiative strengthens the links between African countries. On 1 August 2009, at the last workshop session, 20 countries were already implementing the project. Most of the activities are related to education, but 22 patient-end hospitals in Africa are connected to nine Indian super-specialty hospitals.

The European Commission also recognized the great opportunity for eHealth development and has for that purpose proposed an action plan for its implementation (8, 9). The European Commission called on its members to assess their needs and priorities in the field of telemedicine before the end of 2009 (10). In the latest French health reform (*Loi Hôpital patient santé territoire*) voted in June 2009, telemedicine was promoted as a means to “enable diagnoses, ensure that patients can be followed preventively or after treatment, request expert advice, prescribe products or procedures, or survey patients’ status”.⁶

Although governments and international bodies play a role in channelling many of the initiatives made possible by technological advances, a comprehensive strategy linked with health-care system development and appropriate HRH management is yet to exist. Cost-effectiveness studies are lacking, as the technologies are still at an early stage of development, and the consequences on HRH mobilization are not well taken into consideration.

Virtual outreach services can be an opportunity for HRH redistribution to the benefit of populations in underserved

areas, if there is a strong national commitment associated with stewardship capacity. For this reason it is important to monitor closely the development of eHealth.

2.2 THE BENEFICIARIES OF SERVICES

2.2.1 Direct benefits to populations

Outreach services serve front-line health workers and directly benefit the population in remote and rural areas. According to the level of health professional coverage, the nature of outreach services may vary. Where doctors are very scarce and are mostly working in hospitals or large urban clinics, it is important to include them in outreach services through rotation and mobile clinics. In countries where GPs provide front-line coverage, outreach activities allow access to specialized care.

All outreach strategies aim to deliver health services to the population immediately, avoiding fatal outcomes or complications from delays. Outreach services allow people in remote and rural areas to benefit from health services that are not initially available to them, supported by a national policy under the authority of local or national government.

In areas of high population density, outreach services should not compete with permanent postings of health workers, because they could never cover all the community-based services provided by an on-site health worker.

2.2.2 Indirect benefits through health professional capacity enhancement

Health professionals in remote or rural areas suffer from both professional and personal isolation. This is more pronounced in the developing countries of sub-Saharan Africa and South Asia, where the great majority of the population lives in rural areas. The proportion of urban and rural populations⁷ is shown by economic category in Table 1 and by geographical region in Table 2.

TABLE 1. Proportion of urban and rural populations by economic category, 1995–2005 with projections to 2020

Least developed countries			Less developed regions			More developed countries		
Year	Urban (%)	Rural (%)	Year	Urban (%)	Rural (%)	Year	Urban (%)	Rural (%)
1995	22.9	77.1	1995	39.8	60.2	1995	72.2	27.8
2000	24.8	75.2	2000	42.6	57.4	2000	73.1	26.9
2005	27.0	73.0	2005	45.4	54.6	2005	74.0	26.0
2010	29.4	70.6	2010	48.1	51.9	2010	75.0	25.0
2015	32.1	67.9	2015	50.9	49.1	2015	76.2	23.8
2020	35.0	65.0	2020	53.6	46.4	2020	77.5	22.5

Source: (11).

⁷ Urban population is defined as the population living in areas classified as urban according to the criteria used by each area or country; data refer to 1 July of the year indicated and are presented in thousands. Rural population is the de facto population living in areas classified as rural; data refer to 1 July of the year indicated and are presented in thousands (11).

⁵ <http://www.panafricanenetwork.com/>

⁶ <http://www.panafricanenetwork.com/>

TABLE 2. Proportion of urban and rural populations by geographical region, 1995–2005 with projections to 2020

Sub-Saharan Africa			South and Central Asia			Latin America and the Caribbean		
Year	Urban (%)	Rural (%)	Year	Urban (%)	Rural (%)	Year	Urban (%)	Rural (%)
1995	30.6	69.4	1995	28.3	71.7	1995	73.0	27.0
2000	32.8	67.2	2000	29.5	70.5	2000	75.3	24.7
2005	35.0	65.0	2005	30.6	69.4	2005	77.5	22.5
2010	37.3	62.7	2010	32.2	67.8	2010	79.4	20.6
2015	39.8	60.2	2015	34.2	65.8	2015	80.9	19.1
2020	42.4	57.6	2020	36.7	63.3	2020	82.3	17.7

Note: The regions have been chosen among the developing regions or regions in transition.

Source: (11).

The proportion of the population in rural areas decreased steadily in Africa and South Asia between 1995 and 2005 (from 69.4% to 65% in sub-Saharan Africa, from 71.4% to 69.7% in South Asia). Consequently, front-line health workers are all the more important in these regions for populations' access to health care. Providing these workers with support from health professionals working in urban areas can lessen their workload and motivate them to remain in their localities.

The growing trend towards urbanization will increase the challenge of posting health workers to rural areas. It is therefore important to systematically mobilize health workers in urban areas to work with and for those in rural and underserved areas.

2.3 THE STAKEHOLDERS

2.3.1 Health-care facilities

Health-care facilities can provide close-to-population health services either in decentralized health care structures (usually at the lower level) or outside the facilities (at market, in villages, etc.). When there is no mandatory programme set up by a national or local authority, the initiative should be taken by the health-care facility itself. The rationale for such an activity can be economic (extension of market share) or related to goals of the organization, i.e. improving access to care (in both public and faith-based facilities).

2.3.2 Nongovernmental organizations

Numerous projects supported by nongovernmental organizations are involved in finding solutions to health-care accessibility (in both financial and physical terms). Nongovernmental organizations in both developed and developing countries implement different types of outreach health services (mobile clinics,⁸ virtual tools, etc.), usually in collaboration with local health facilities and authorities. Health workers involved with such organizations fulfil their spiritual and social motivations through the appreciation expressed by the beneficiaries of the services rendered.

⁸ Some examples are Doctors for Africa (sub-Saharan African countries), AMREF (East African countries), and Expedicianários da Saúde (Brazil).

2.3.3 Government and local authorities

In order to respond to the uneven distribution of health professionals in the country, the local and national authorities can mobilize hospitals and their staff to support or perform health-related activities in places that are difficult to reach. Integrating activities into the national health plan is a key factor for improving remote and rural populations' health outcomes on a large scale (12–14).

2.3.4 International institutions

Accessibility to primary health care is a WHO objective (15), which it fulfils by developing programmes to ensure that access to health care is granted to underserved populations (16). In addition to specific programmes, a variety of WHO's activities targeting specific diseases or supporting eHealth can involve outreach initiatives. Development partners and leading multilateral organizations do not specifically support the development of outreach services, but they participate in funding the national health-care priorities that may include such programmes.

2.3.5 The private sector

The private sector includes a large variety of collaborators such as providers of goods and services, as well as health-care providers, under several types of ownership (for-profit, faith-based, or non-profit). To support the dissemination of virtual tools, the corporate private sector of goods and services has developed innovative strategies to adapt its products to local conditions. Mobile telephones are a good example: commercial enterprises market cell telephones to the population according to their disposable income. By developing health applications, the manufacturers participate indirectly in improving health outcomes. In certain countries, partnerships between industry and the health sector is implemented to respond to national health challenges (17).

Corporations are playing an increasingly large role in health care worldwide, including in remote and rural areas. For example, Cisco Systems Inc. has developed numerous virtual health tools for remote populations in developed countries, such as that used in Alaska, United States of America (18). As they are based mainly on high-speed broadband, these approaches are not yet suited to most developing countries because of poor connectivity.

The strategy of the private sector is a mix of corporate social responsibility and self-interest in growth opportunities. Corporate social responsibility supports health applications in emerging markets in countries where competition between companies is strong. The purely commercial approach is more frequent when innovations can provide a market opportunity for products and services.

In the past, the private sector has also provided health services for its workers, especially in mining and large-scale farming industries, which frequently took place in

remote areas. The growth of activities and influx of workers transformed the nature of these locations from underserved to well-served areas; the services also benefited the local population.⁹

3. METHODOLOGY

It is almost impossible to be exhaustive as far as information on existing initiatives to develop outreach services is concerned. There are few publications on this topic, and many initiatives are very small-scale and local. Most of the available documentation is descriptive and related to the benefit of the activity for the population, but it is difficult to find economic analysis, and even more problematic to obtain details on HRH mobilization.

3.1 LITERATURE REVIEW

A web-based search was conducted to initiate the literature review. A selection was made to keep the most relevant and well-documented case-studies.

The search engines used were MEDLINE, PUBLINE, Science Direct, Google Scholar, BMJ, and Wiley Interscience, with the following keywords:

- Outreach health services
- Developing countries
- Mobile clinic
- Rural health facilities
- Telemedicine
- Rural access health services
- eHealth
- Rural health services

The research covered the period from 1995 to 2009. Few articles on physical outreach were found, but many articles were located that deal with the virtual tools and services. The articles are mostly descriptive and there is an important focus on education, which is not the subject of this work.

Documentation on outreach activities is generally very poor: outreach is mentioned as a reference to the delivery mode but not as the study's subject. Access to grey literature was not possible in the time available. Out over 150 references retrieved, only seven were selected for physical outreach services and six for virtual outreach activities. All are descriptive case-studies that do not respond to the key questions related to HRH mobilization and efficiency of such approaches. The selection of case-studies was made on the basis of the most complete information provided for a specific approach. We avoided the duplication of articles on similar subjects or where there were no major differences in the description of the experience, although there may

have been differences in terms of countries, settings or time periods.¹⁰

3.2 IN-DEPTH INTERVIEWS

To complete the research, interviews were organized with the most relevant stakeholders or researchers to obtain more details on activities. Furthermore, we took the opportunity to use the International Hospital Federation (IHF) membership database to contact its members and collect additional evidence.

The following information was requested:

- Brief history of how and when the activities have been launched.
- Description of the project and activities.
- Population served and nature of service provided and pathologies treated.
- Health professionals involved and stakeholders (nongovernmental organization, government, or other).
- Health professionals' qualifications and training.
- How health professionals relate to the hospital.
- Estimate of annual time spent for this activity per category of worker and type of task.
- Breakdown between activity in the field and activity in the main hospital as remote support.
- For telemedicine: nature of technical requirement for setting it up, actual services provided to patients and/or front-line workers.
- Financial data to estimate the cost of the activity and how it is financed.
- Health outcomes.

It was not always possible to obtain data for each case-study. The absence of data reflects the fact that activities are implemented without a proper monitoring and evaluation framework. The internal information system is often weak and does not capture essential data on resource mobilization. There is very limited monitoring of the utilization and productivity of the health workforce – the example of outreach services is a good illustration of the poor attention paid to this issue. Facilities most often use the staff for activities without keeping track of staff time spent on each activity and with no measurement of these activities' outcomes.

These findings are informative on their own. Outreach activities have not been thoroughly documented as a service delivery alternative, even in countries where they have been implemented as part of the regular activities of a district. Most of the available information is anecdotic, describing activities performed without concern about HRH efficiency or optimization. Many activities are supported by charitable organizations responding to a demand for access to care from underserved populations.

⁹ Mining companies in Guinea (Friguia bauxite-alumina complex at Fria) or the Niger (Uranium in Arlit), as well as large banana plantations in Cameroon (Haut Penja) are examples of the role of the private sector providing care in underserved areas.

¹⁰ Readers are invited to complement this report with the Cochrane Collaboration's review *Specialist outreach clinics in primary care and rural hospital settings*, published by John Wiley & Sons Ltd., 2009, which was not available at the time of writing.

4. RESULTS

4.1 OVERVIEW OF PHYSICAL STRATEGIES

TABLE 3. Summary of case-studies: physical outreach services

Country or region	Project	Target population	Staff involved	Results	Funding	Incentives	Further information
Brazil	Mobile surgery (Expedicionários da Saúde)	Indigenous people (Brazilian Amazon)	Health and non-health professional	1802 surgeries in 5 years (€ 380 per surgery and € 27 per clinical procedure)	Expedicionários da Saúde	Volunteering	Brazilian Health Expeditions, Campinas SP, Brazil (http://www.expedicionariosdaude.org.br/) and Annex 1
Namibia	Ear camp for children	Children with ear problems	Oto-rhino-laryngologists	31 children in 6 months	Private medical and transport companies Private donors		(19)
Sub-Saharan Africa	Mobile Clinic Africa	Population in remote and rural areas	US doctors		Private donors		US Doctors for Africa, Sherman Oaks, CA, USA (http://www.usdfa.org/index.cfm?view=Proj_MobileClinicAfrica) All Africa Global Media (http://allafrica.com/stories/200804090524.html)
Papua New Guinea	Rural Outreach Services	Health-care centres	Goroka General Hospital staff		Local and national health institutions		Goroka General Hospital: Rural Outreach Services (http://www.ggh.org.pg/rural-outreach-services/)
Nepal	Glaucoma screening and education	Screening clinics in villages	Tertiary private eye hospital located in the capital	2004–2007: diagnosis of 120 individuals with glaucoma	Referral hospital and donors	Salary and extra hours are paid	(20)
Australia	Specialist outreach services	Indigenous population living in disadvantaged and isolated areas in the Northern Territory	Royal Darwin Hospital staff	2339 new surgical problems diagnosed in 11 years	District hospital, local communities' primary health-care centres and the national Government	Salaries covered	(21, 22)
Rwanda	Integrated physical outreach	Population attending health centres	District hospital physicians		Ministry of Health	Results-based financing	Annex 2
USA	Rural Health Program	Specific rural groups: elderly people, children, women, ethnic groups and homeless people	Various, depending on the target		Rural Health Care Service Outreach Grant Program		(23) and US Department of Health and Human Services, Health Resources and Services Administration, Rural Health (http://www.hrsa.gov/ruralhealth/)
Viet Nam	Project 1816	Population in rural areas, especially mountainous areas	Rotative assignment of qualified staff from high level to support low-level hospitals	70 434 patients received treatment; 1882 surgeries implemented; 30% referral cases reduced		Rotative assignment	Annex 3
South Africa	Mobile Health Clinics	Rural populations (HIV/AIDS and reproductive health)	FHI staff		<ul style="list-style-type: none"> FHI PEPFAR Department of Health 		Family Health International, Durham, NC, USA (http://www.fhi.org/en/CountryProfiles/SouthAfrica/res_LaunchMobileClinics.htm)
Uganda	Surgical camps and specialist outreach	Rural population	Registered surgeon in the "Association of Surgeons of Uganda"	1997–2004: more than 4500 operations in 13 camps	Ministry of Health		(24, 25) and Uyeno L, Watya S. <i>Strategies for improving surgical access in rural Uganda: evaluation of multifaceted outreach and specialist camps</i> . Unpublished presentation, 2005.

The annexes give details of three case-studies on physical outreach services. The complete research is available at <http://www.ihf-fih.org>

The case-studies illustrate two types of physical strategies: facility-based models and mobile strategies. As mentioned above, stakeholders vary and strategies also differ according to the country, its health needs and priorities and the level of health service supply in the area.

Most of the above strategies are small-scale. In fact, this study contains few initiatives on a national scale. Very often, the services are localized and are for a fixed period, e.g. mobile clinics in Brazil provided surgery services to Indigenous people for eight days, several times a year (see Annex 1).

For this reason, quantitative data (e.g. numbers of patients who received surgery) are not always relevant on a national scale. Quantitative health outcomes are usually positive, because people living in remote areas would not have benefited from the health care they needed without outreach services.

Modalities of intervention vary because outreach services cover a large scope of activities. Specific projects are often described, linked to a specialty or a pathology and promoted by those involved in treating the condition, e.g. cataract surgery supported by nongovernmental organizations dedicated to eye health. The rationale for the intervention is linked to a medical technique that brings rapid results at low cost. The Rwanda case

study (Annex 2) is a good example of a hospital-based strategy supported by the Government at local and national level.

Figure 1 illustrates the large set of programmes that can be put in place to involve health workers in underserved areas. The three discs represent the different modalities:

- **Strategy.** According to the local needs, context and national health system, certain strategies are more relevant than others. For example, Brazil has opted for a mobile strategy: the region is so remote and logistic issues so complex that HRH rotations would not be efficient. Conversely, Project 1816 in Viet Nam deploys health workers on a rotational basis to underserved areas to balance HRH distribution in the country.
- **Support.** Outreach services can be organized by different entities: hospitals, private companies, nongovernmental organizations, or local or national authorities.
- **HRH involvement.** Health workers can volunteer from the country or from abroad, or outreach activities can be part of their job description.

The overlap of the three discs demonstrates the kind of programme that could be put in place. This model is not inclusive: it aims to give an overview of possible combinations and provide inspiration for decision-makers to engage responses that fit best with their priorities.

FIGURE 1. Expedicionários da Saúde in Brazil

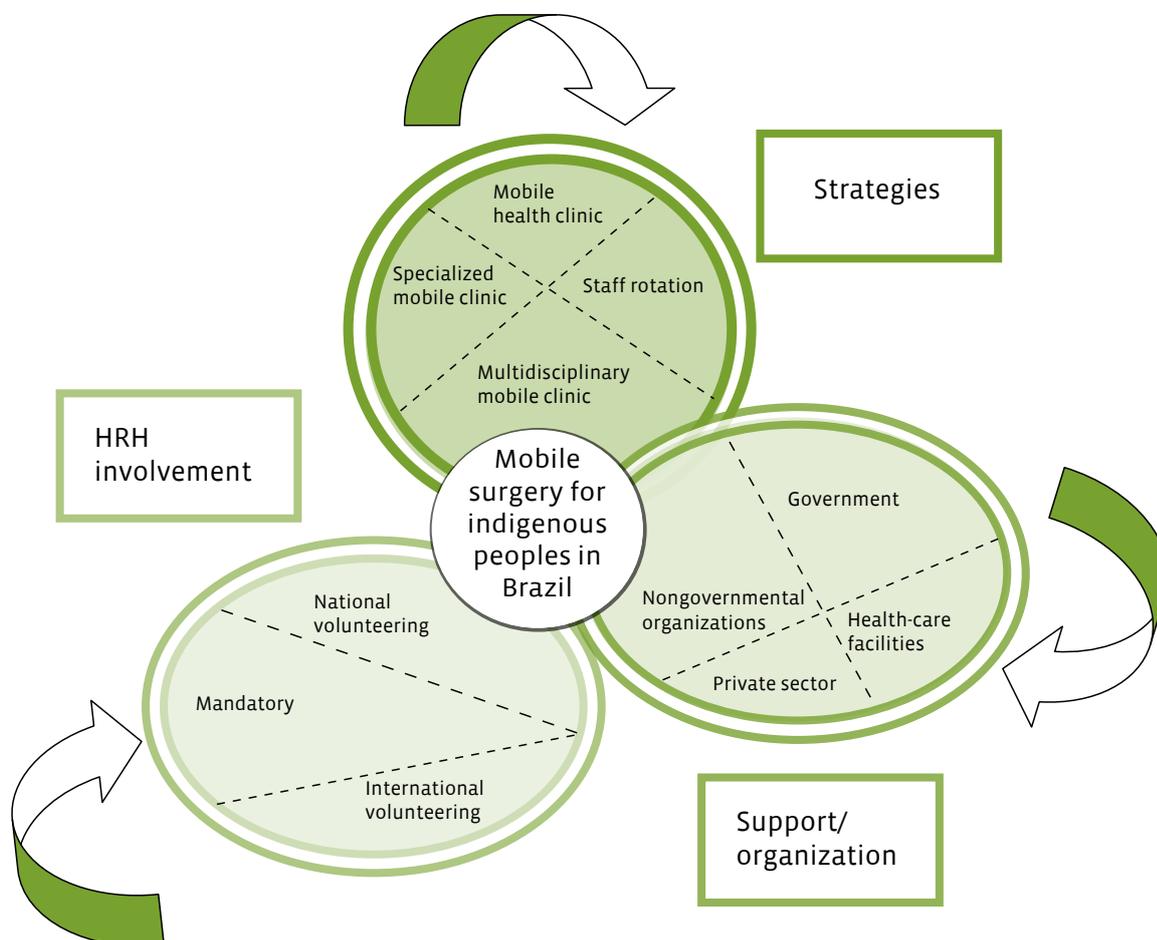
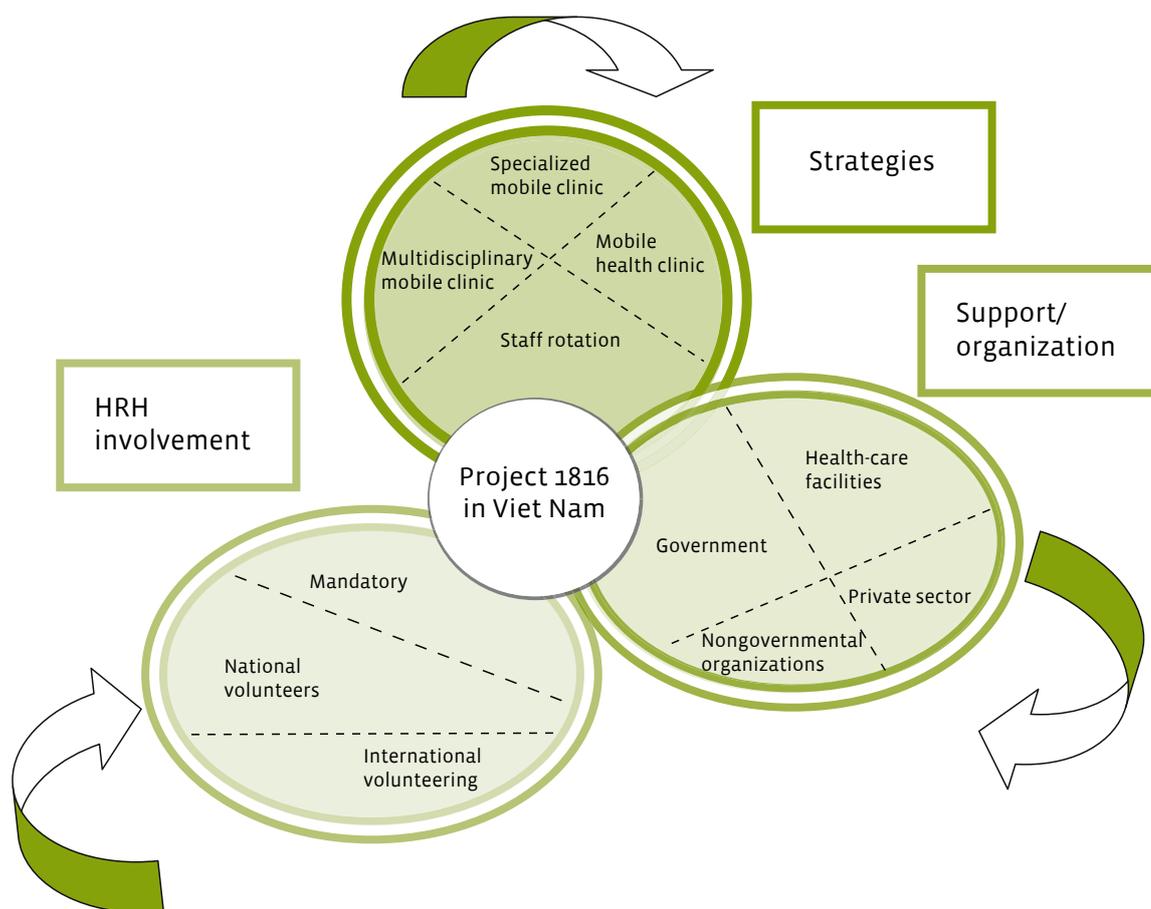


FIGURE 2. Project 1816 in Viet Nam



4.2 OVERVIEW OF VIRTUAL STRATEGIES

TABLE 4. Summary of case-studies: virtual outreach services

Country or region	Project	Target population	Staff involved	Results	Funding	Incentives	Further information
French-speaking countries in Africa	Réseau en Afrique Francophone pour la Télé-médecine	Health-care professionals in remote and rural areas	Local health professionals and staff of Geneva University Hospitals		Local hospitals and Geneva University Hospitals	Financial and educational	(26) and Annex 4
Rwanda	eHealth Rwanda	Health facilities		TRACnet links all facilities supporting AIDS Program	Rwanda Government donors	Performance-based financing	(17, 27) and Annex 5
Cambodia	Store-and-forward Telemedicine	Population in underserved areas		264 visits made (2005)	Private donors		(28)
Canada, Ontario Province	Ontario Telemedicine Network	Population living in remote areas	1500 health professionals and 800 specialists	32 000 consultations per year	Provincial Government		(29)
Australia	Teledermatology in Australia	Rural and remote areas	Local health professionals and dermatologist		Commonwealth Department of Health and Ageing	Health professionals in the field learn from specialist	(30)
Nepal	HealthNet Nepal	Health professionals in rural areas	3 rural hospitals and 3 central hospitals		PAN Asia programme of IDRC, Canada	Support material for health professionals; isolation decreased	(20, 31) and Annex 6

The annexes give details of four case-studies on virtual outreach services. The complete research is available at <http://www.ihf-fih.org>

4.2.1 Information and communication technology support

ICT offers fast communication and virtual tools that support both the strengthening of HRH and the provision of services to populations living in remote or rural areas. The Internet, satellite communication and mobile telephones can overcome geographical and socioeconomic divides. Nevertheless, there are still several issues to contend with, in particular the cost of telecommunications and the level of infrastructure.

Telecommunications are not fully deregulated in Africa (32). In 2003, 60% of local and international call services in Africa were monopolies and 10% of African countries still allowed monopolies for VSAT,¹¹ the Internet and mobile telephones. In addition, due to poor infrastructure, 70% of Africa's Internet traffic needs to be routed outside Africa. These elements explain why the cost of Internet connectivity in Africa is the highest in the world – some US\$ 250–300 per month, according to the World Bank (33). In the United States, the cheapest monthly tariff for 20 hours of Internet use (50% peak time and 50% off-peak) is US\$ 15. In sub-Saharan Africa, equivalent access costs US\$ 55 on average, which is higher than the nominal gross national income per capita in 26 countries of the region.

As regards the challenge of weak infrastructure, without public subsidies international telecommunication companies have no incentive to invest in equipment. The weak purchasing power of populations implies a much lower return on investment than in more developed regions. For this reason, a francophone telemedicine network in Africa (RAFT)¹² is funding the initial two years of Internet subscription for each country coordination team so that they can engage in continuing education activities for doctors in remote areas (see Annex 4).

Sub-Saharan Africa has the lowest rate of Internet usage in the world. South Asia usage also remains at a low level, but the higher annual growth rate demonstrates a better penetration of ICT (see Table 5). These data, coupled with those on the availability of the health workforce, indicate that both sub-Saharan Africa and South Asia are regions where ICT growth will be the greatest in the coming years, as these regions are not yet engaged in virtual activities.

Liberalization of the African market, together with partnerships between the public and private sectors, has the potential to improve the situation. Considering the level of Internet usage and the quality of connectivity, it will take several years before virtual outreach services are implemented in remote areas. The infrastructure bottleneck could be overcome more quickly if investments were supported by proactive and publicly subsidized policies.

¹¹ VSAT (very small aperture terminal) is a satellite communications system that serves home and business users.

¹² The network, funded and staffed by Geneva University Hospitals (<http://raft.hcuge.ch/>) in collaboration with local facilities, has been active since 2001 and is currently present in 15 French-speaking African countries. Since October 2008, it has extended its activities to English-speaking regions.

In high-income countries, the level of Internet usage and the quality of the broadband allow virtual outreach services to be developed more rapidly, as described in the case-studies.

In low-income countries, providing more extensive virtual outreach services can reduce HRH migration outflows by reducing the feeling of isolation and improving the professional environment. Unfortunately, the fragility of the Internet connection does not allow the full development of such potential activities.

There is also an opportunity for high-income countries to partially mitigate the migration flow from low-income countries by providing them with remote services. This may be considered as a small-scale intervention at the present stage, but it has great potential if practised in conjunction with rotation of health professionals. Looking at the figures, we can see that in France, for example, there were about 8000 foreign physicians out of more than 200 000 registered doctors in 2005 (35). If an average of 5% of actual working time were dedicated to eHealth outreach activities benefiting front-line health workers in countries of origin, the impact of migration could be offset, to a certain degree. Obviously, remote support cannot fully compensate physical presence, but this example shows how migration could be partially mitigated.

In low-income countries, outreach services can be supported by mobile telephone technologies. In this area, both coverage and growth are impressive.

There are three times more mobile telephone subscribers than Internet users in East Asia and the Pacific, 4.5 times more in Europe and Central Asia, 2.5 times more in South Asia, five times more in Africa and 2.5 times more in Latin America and the Caribbean. These figures indicate that the development of new outreach services using mobile telephones is a priority, especially for services dedicated to patients.

4.2.2 Telemedicine

It was decided to review only a sample of the many available publications on telemedicine. However, most publications do not mention the human resource component, despite it being critical for the sustainability of the activity.

Telemedicine can provide support for health professionals in the fields of diagnostics and treatments, as in Canada (29) or through the RAFT network. In addition, virtual strategies can include services directly designed for patient use, through online consultation, e.g. tele-dermatology services in Australia (36). Another major function is to provide continuous training via videoconferencing.

The examples illustrate different levels of cooperation: cooperation with another country or collaboration within a country between front-line health workers and a reference hospital. The RAFT experience is also an example of a regional network among countries with similar epidemiological profiles.

TABLE 5. Internet use by region, 2000–2007

Region	2000 (%)	2001 (%)	2002 (%)	2003 (%)	2004 (%)	2005 (%)	2006 (%)	2007 (%)	Annual growth rate (%)
East Asia and Pacific	1.91	2.8	4.44	5.76	6.88	8.39	10.27	14.58	34.41
Eastern Europe and Central Asia	2.60	3.73	6.80	9.66	13.24	15.76	18.83	21.37	36.68
South Asia	0.48	0.68	1.50	1.90	3.15	3.64	5.99	6.62	49.23
Sub-Saharan Africa	0.51	0.65	0.90	1.20	1.54	2.16	3.30	4.36	36.21
Latin America and the Caribbean	3.84	5.53	9.09	11.47	14.54	16.47	22.06	26.94	32.94
High-income countries (OECD)	32.88	39.10	49.44	53.76	59.06	62.36	65.00	67.72	11.14

Source: (34).

TABLE 6. Mobile telephone subscriptions (per 100 people) by region, 2000–2007

Region	2000 (%)	2001 (%)	2002 (%)	2003 (%)	2004 (%)	2005 (%)	2006 (%)	2007 (%)	Annual growth rate (%)
East Asia and Pacific	5.81	9.90	13.89	18.77	23.92	28.57	34.13	43.65	34.31
Europe and Central Asia	7.84	12.09	17.88	26.19	41.76	62.70	82.28	95.03	43.55
South Asia	0.34	0.62	1.19	2.74	4.34	7.92	15.28	22.82	84.00
Sub-Saharan Africa	1.70	2.47	3.56	5.00	7.34	11.99	17.55	22.98	45.32
Latin America and the Caribbean	12.14	15.91	18.87	23.21	31.78	43.33	54.48	66.96	27.80
High-income countries (OECD)	51.65	60.35	65.26	70.95	77.49	85.15	92.13	98.66	9.73

Source: (34).

Although telemedicine appears to be a good solution for the future, some limitations can be identified:

- infrastructure requirements;
- operability;
- training health workers to use these technologies;
- costs (investment, operation, maintenance, and telecommunication);
- user perception of reliability of advice and/or technology (health professionals and patients).

Until now, it seems that the development of telemedicine had been driven more by technical considerations and interest to promote innovation than by rational decision-making processes that take into account resource mobilization and benefits. Although telemedicine has existed for over a decade, its modest expansion reflects the limited support strategies it has acquired as part of national health development plans. One reason is that decision-makers have not fully considered the potential of telemedicine to mobilize human resources. Targeted support teams already busy with their current local tasks have no incentive to engage in distance activities, especially without formal recognition or funding to cover the opportunity cost of such activities. Once the excitement of participating in innovation has passed, the absence of adequate incentives places the staff back in their local context.

4.2.3 Virtual technologies at a crossroads: mHealth

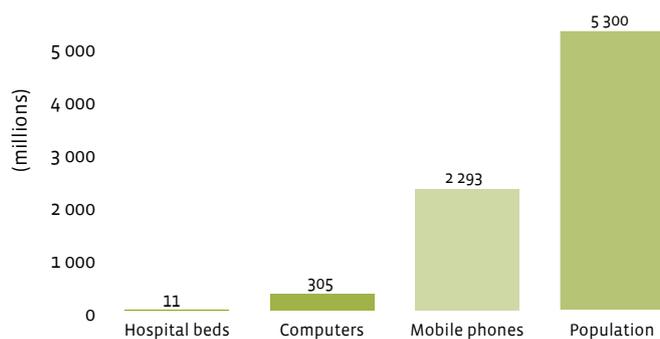
Patients may use mobile telephones to receive and send text messages. They can contact health workers, and they can receive and make telephone calls related to health education, treatment adherence, appointments and transport to health services. This is a demonstration of mHealth – mobile telephone-based health services (see Annex 7) – which can be seen as a sub-component of eHealth.

Health workers may receive diagnostic support, consult with colleagues, communicate with patients, enhance their skills and gather and analyse data using mobile devices. More sophisticated applications are being tested, for example the use of cameras, automatic location detection and access to different communication technologies, such as Edge and 3G.

Numerous health services worldwide are based on mobile telephone technology, which is increasingly being applied in a broad range of health services at all levels of care:

- In primary health care, mHealth marks a transformation of health-care delivery towards patient-centred care, comprising increased patient education and awareness; distance surveillance of health outcomes and data collection; and disease and epidemic outbreak alerts and monitoring.

FIGURE 3. Technology and health-related statistics for developing countries



Source: (37).

- In secondary and tertiary health care, mHealth can enhance both diagnosis and treatment. In India, the Apollo Hospital group has put in place such services allowing populations in remote settings to benefit from the expertise of physicians working in urban hospitals (38).

mHealth applications can be developed to communicate with and train health workers in remote areas. Examples of distance health services include health information and individual treatment follow-up. Third generation (3G) mobile telephone technologies, which have been gaining ground since 2001, offer new opportunities: a general hospital in Austria developed a technique for melanoma screening with mobile telephones in 2007, sending the images to specialists for diagnosis (39). Thanks to its outstanding image quality, this technique has the potential to increase the diagnostic capacity of health workers in rural and remote areas.

mHealth programmes are widely distributed throughout developing countries, and various areas of application exist such as communication and training of health care workers, disease and epidemic outbreak tracking and remote monitoring and data collection. Georgia, India, Nigeria and Uganda have put in place interesting initiatives to promote HIV/AIDS education and safe behaviour. Peripheral health-care structures report health and demographic data directly to the central level, thereby avoiding paperwork. For example, in India, Media Lab Asia and Sustainable Health System have piloted the Community Accessible and Sustainable Health system (CASH) project, which seeks to collect data on maternal and child health over five months.³³ This has shown encouraging results for local health workers, enabling them to save time which frees them up to dedicate more time to patient care. While not compensating for a lack of front-line health workers, these kinds of services increase health workers' capacity to provide care and to better integrate their activities into the health-care monitoring and evaluation system.

³³ Sources: <http://www.dimagi.com/content/cash.html>; <http://www.medialabasia.in/healthcare.html>; <http://kaash.sourceforge.net/doc/dydo2.pdf>

4.2.3 The impact of mHealth projects

Formal studies and preliminary project assessments – in both developed and developing countries – demonstrate that mHealth technologies improve the efficiency of health-care delivery and, ultimately, make it more effective. The long-term goal and expectation is that mHealth programmes will have a demonstrable and significant positive impact on clinical outcomes, with a particular focus on primary health care (15).

Benefits in population health

Benefits include compliance in treatment. A 2007 pilot study in South Africa showed that with SIMpill, 90% of patients complied with their medication regime, compared with the typical 22% to 60% compliance rate without the system (40). In Tanzania, a study found improved drug adherence rates patients who received text messages reminding them to take daily medication compared with patients who did not (37). Other studies conducted in Australia, Finland, the Republic of Korea, and Spain on the utilization of mHealth in areas such as vaccination follow-up and asthma or diabetes self-care conclude that mobile technology demonstrably improves patient compliance. Other benefits are improved public awareness and disease management.

The mHealth approach can provide some relief for health workers in terms of workload and could result in a lower health worker-to-population ratio for similar health outcomes. In China, a study conducted by Zhejiang University on text messaging the population demonstrated an increase in attendance of patients at health promotion activities (41).

In addition, the workload to monitor compliance of treatment can be shifted from front-line health workers to a specialized unit based elsewhere, i.e. in a more attractive location for increased retention. This is an example of how technology may have an impact on the distribution of work between front-line workers and support services. It further illustrates the fact that retention strategies have to be linked to a broader perspective of HRH mobilization to deliver services to the population.

Health system outcomes

The 2006 report of the Clinton Global Initiative's Task Force on Capacity for Program Delivery (42) lays out a process for determining the effectiveness of current and future mHealth programmes (37). Working with international partners (WHO and ministries of health of the pilot countries), the Task Force developed a framework for assessing different experiences around the world. It identifies unforeseen technical, logistic and decision-making issues in pilot studies. Critical challenges appear in the short term – particularly the service's financial sustainability. The long-term perspectives have yet to be assessed due to the lack of measurement of health outcomes (impact on mortality rate, gains of DALYs,³⁴ etc.). Such a

³⁴ Disability-adjusted life years.

measure is now a priority to move from potential benefits of the utilization of mHealth to actual results for the population.

Until now, mHealth has mostly been used for specific diseases, especially HIV/AIDS and related opportunistic infections. There is a need to extend the utilization of mHealth to a broader scope of health interventions. For all kinds of chronic diseases, it is clear that mHealth has the potential to enhance health management and to disengage health services from the physical availability of health workers.

It is not easy to determine whether telemedicine is cost effective in developing countries, since this would require a properly controlled scientific trial. Unless this can be done, the answer to this question will remain uncertain (43). Nevertheless, when human resources are scarce, access to health professionals may only be possible through these means. Telemedicine will therefore be effective if used in prioritized public health activities. Furthermore, telemedicine use is also related to the nature of the health-care financing model and what policy options are adopted at the national level to provide equitable access to care. Telemedicine is obviously not meant for primary health services, but it becomes a significant means to mobilize specialized health workers to support front-line HRH facing complex medical cases.

4.3 BENEFITS OF OUTREACH SERVICES

4.3.1 Positive health outputs

The different experiences covered by this review show positive and encouraging health outputs. Quantitative indicators, e.g. numbers of patients treated, are often collected, but the absence of systematic reporting makes it impossible to measure the impact nationally. In the case-studies in the annexes, there is no measurement of results expressed in terms of impact on countries' burden of disease. At the local level, however, each of these activities has a positive health impact on the communities which, in the absence of such interventions, would not have had any access to care. Without larger-scale studies, it is not possible to estimate the potential impact of outreach activities on health outcomes.

Furthermore, outreach strategies have an impact on care demand, which is limited by financial and geographical factors; if those factors were partially removed, the demand for care would increase. In Australia, outreach services to rural Indigenous populations have triggered specialist follow-up visits (21). Experiences in both developed and developing countries about diabetes surveillance via mobile telephone have shown the growing involvement of patients in seeking more appropriate care (10). In Nepal, the Glaucoma Awareness Week triggered an important increase in demand for eye screening (20).

Outreach services can provide closer surveillance of the population, which would improve the continuum of care and make collecting, retrieving and disseminating health

information more efficient and comprehensive. This contributes to disease surveillance and to better health care management. The workload related to disease management can be better shared between front-line workers and back-up teams. Reaching out to the population can also save a lot of time for health workers, while involving more people in participating in priority health programmes. In South Africa, the Masiluleke project of 2008 consisted of sending 365 million text messages to the population, encouraging them to be tested and treated for HIV/AIDS and TB (44, 45). Such massive communication has an impact on individuals and the whole population. The project would not have been possible on such a scale through direct HRH-to-population interaction.

Some of the experiences described in this report have been extended. This can be interpreted as a sign of success. For example, the telemedicine network launched in the francophone African countries is being developed for other transnational languages, such as English and Arabic. Elsewhere, the success of initial outreach activities has motivated the collaborating hospitals to provide a wider range of benefits to the populations they serve.

4.3.2 Increasing access to health specialists in remote areas

Most developing countries lack specialists. This is particularly the case in remote or rural areas, where front-line health centres are very often staffed only with nurses. Outreach strategies can provide specialist visits (e.g. dermatology in Australia and ophthalmology in Nepal) to underserved populations. In some cases, specialists go to remote facilities for short periods of time but on a regular basis. With virtual strategies, specialists are consulted in a more rapid and interactive way and their advice increases the capacity of front-line health workers.

Furthermore, the continuous availability of qualified health workers, such as provided by the telemedicine model, can enhance the referral system. Quick and direct connection to a qualified health worker will allow the patient's referral needs to be better identified. Conversely, if patients know that consultations with a qualified health worker are available in the area, they may be encouraged to consult there before (or instead of) going to a hospital. This can increase the relevance of referrals and also reduce expenses to the population or delays compromising health outcomes. Tele-assistance to front-line workers may increase the immediate workload of health workers but it should also improve health outcomes. Unfortunately, to date, documentation on tele-assistance has not fully assessed the impact on the workload of both front-line and back-up health workers, and the impact on health outcomes. Such an evaluation is a priority before scaling up this approach.

Without outreach activities, specialist competencies would not serve populations in remote areas. These activities increase the effectiveness of front-line health workers and respond directly to patients' concerns. Poor monitoring

of human resource activities in facilities does not allow either the measurement of the time allocated to these activities or the definition of evolutionary trends in recent years. Outreach services can be used by policy-makers to reduce inequity in access to care by inciting health workers based in well-served areas to dedicate part of their time to underserved populations. To do this, it is necessary to improve human resource management monitoring and evaluation tools.

4.3.3 Increasing quality of care and confidence in the health system

Outreach services can also increase the quality of care provided in remote areas. Sharing experiences on practice and the transfer of technologies and know-how has a positive impact on the quality of care. Increased access to new technologies for diagnosis and treatment will also enhance the quality of care, by improving the reliability of results. Furthermore, the continuum of care benefits from the collaboration between health professionals, as well as from health data collection. Consequently, the patient is better oriented within the health-care system. Problems such as drug interference or medical errors may be avoided, thanks to improved communication between professionals.

The perception of the quality of care is another factor to stimulate demand for health care (46). In the various case-studies where outreach services included a front-line support component, patients expressed more trust in their local health centre. Creating confidence in the supply of care can be considered essential, because patients will be more motivated to express their health needs if they know that they may be taken into account. This is the first step for improving health outputs and outcomes, especially in remote areas where the populations' annual visit ratio is very low.

Furthermore, the willingness to pay is an element that has to be taken into account. The experience of tele-medicine in Cambodia shows that patients are willing to pay more, because they know that care will be better and more reliable (28); they perceive added value in spending their revenue in the health structure. This willingness to pay to obtain services is also consistent in studies from Africa, and it shows that there are possibilities to mobilize resources to pay health workers, as long as the population is confident in their ability to respond to its health needs (20).

4.3.4 Time and cost saving for patients in remote areas

Time and cost to access health facilities often constitute a major obstacle to seeking care. It is not uncommon for a patient to be obliged to allow one full day of travel in order to access a health structure. These indirect costs can be so high as to be catastrophic for the financial stability of a household.

Mobile strategies respond to this concern. Patients can have access to care without spending time and money on a long

journey to the health facility, such as in Brazil's Amazon region. Furthermore, if diagnostic capacity is increased, an early detection of illness is possible with potential gains in efficiency (better health outcomes at lower cost) for health-care delivery.

A better collaboration between different levels of the health system can potentially reduce costs at all levels: avoiding inadequate referrals to hospitals (by providing more appropriate diagnosis and follow-up treatments from the start) and the replication of care and visits (by sharing patient system information between practitioners) (47). It is even more important in the context of developing countries where, in addition to scarce economic resources, health insurance coverage is either inexistent or very low. A recent study (48) on the importance of "catastrophic spending"¹⁵ in low-income countries found that up to 15% of households are affected. A large part of catastrophic expenses result from hospital spending that could be avoided if referral had been decided in a more appropriate way.

A study in Canada compared the cost of an outreach strategy with that of patients undertaking travel (49) and demonstrated the benefits of specialist outreach health services in terms of saving cost and time. The same study also demonstrated the potential increase in health-care demand.

In the context of the limited availability of health workers, mobile activities can be challenged for the large portion of productive time spent travelling, so such a strategy must be considered with caution. There are examples of effective mobile strategies for mass immunization, but the level of participation of the population may vary according to incentives, making the strategy more or less effective in terms of human resource mobilization (50). For very specific activities, a mobile strategy can be effective in delivering services to the population, but available data do not allow for conclusions to be drawn on the efficiency of HRH utilization for such a task. Mobile strategies are a good illustration of the tension between equity of access and the efficient utilization of scarce human resources. At a certain point a political choice must be made to decide the priority for the region or the country. The World Health Assembly resolution on global immunization strategy (WHA58.15) includes outreach activities in the five operational components needed to reach every district (51).

4.3.5 Continuing education for health workers

It is essential to build and strengthen health workers' capacities in order for an effective health system to provide quality care. In underserved areas, it is often difficult for health workers to have access to continuing education: schools and training centres are mostly located in attractive areas, where the potential number of students is higher.

¹⁵ Spending is deemed «catastrophic» when a household spends more than 40% of its subsistence revenue on health care.

However, technology now allows continuing education and exchange through videoconferences, online courses, etc. In Nepal and Viet Nam, for example, education is not only an indirect benefit of the programmes, it is also part of the rationale of the project.

By creating social and professional networks, outreach services allow the transfer and exchange of knowledge between:

- a specialist and a GP (e.g. the specialist outreach strategy in Australia);
- a high-income country and a low-income country health worker (e.g. mobile clinic in Africa supported by GPs from the USA).

The education of health workers already represents an important stream of work in the various activities undertaken by WHO, so this aspect may not be in need of further development: there is substantial evidence on the benefit of outreach activities in supporting continuing education (53:Recommendation A5). It is also clear that in this instance, as is the case for other outreach activities, a bundle approach can produce better results than a single intervention.

4.3.6 Mitigating health professionals' feelings of isolation

Feelings of isolation and loneliness are very common in remote areas, where health workers can be confronted with excessive workloads and have no peers with whom to share views on the difficulties they face. Feeling better at work increases the productivity and motivation of health workers, and helps retain them in remote areas. Unfortunately, case-studies did not provide solid qualitative or quantitative assessment of reduction of feelings of isolation, though health workers in remote areas who have a strong link with remote teams recount numerous anecdotes of the benefits.

Virtual tools can overcome feelings of isolation, as expressed by Dr Diakaridia Troaré in Mali. Working 800 km from the capital in a rural hospital, he was the first health worker to stay active for more than four months in this remote area thanks to the use of the RAFT Network, which allowed him to perform health care and stay in contact with his family and friends.

Supporting outreach activities can foster team spirit within the hospital team. In cooperation agreements between low- and high-income countries, cultural exchange can be a source of personal development. It also acts as a way to increase the awareness of health professionals located in well-served areas on conditions of work in underserved areas. It appears that outreach activities create a double motivation: The isolated health workers feel better because they can be supported by peers operating in better-served areas, while those who get involved in providing support to underserved areas become more conscious of the importance of providing such services, which increases

the internal sense of solidarity within their own facility. For these reasons, it is important that support to underserved areas is organized in such a way that large numbers of staff are mobilized.

Nevertheless, a lack of data on this topic is evident. The activities of nongovernmental organizations are based on charitable involvements with limited scope. No assessment has been undertaken of the time and effort needed for the mobilization of health workers for outreach activities by nongovernmental organizations and their operational partners. The health workers mobilized in outreach activities are usually chosen after a selection process, but no data mention the number of candidates. We have no information on the turnover of volunteer health workers, or whether they are satisfied with their tasks. In Australia, however, specialists appreciated the initiatives implemented by the Northern Territory authorities allowing them to know better the working conditions of their colleagues practising in Indigenous communities (21).

4.4 CHALLENGES OF OUTREACH SERVICES

4.4.1 The need for more data

Outreach strategies are often implemented on a small scale. They are not well documented because they are considered either as charity or as part of the delivery system. The existing reports generally describe the projects and give some data about activities, but analytical information is scarce.

Because of limited attention paid to delivery services and to human resource productivity, there are no studies that fully assess outreach services in terms of health outcomes and impact and human resource mobilization. Knowing the real impact of these activities is essential to develop efficient strategies. Comprehensive assessment would also allow decision-makers to have a realistic overview of health issues in remote and rural areas.

Financial data are lacking, so it would be useful to commission cost-effectiveness analyses in order to identify the most effective strategies. Full costing of activities is rarely taken into account. Indirect costs – such as the time spent for organizing the activities – or opportunity costs are difficult to measure. As long as the activities are limited in scale, there are no major consequences of not knowing their exact cost, but this becomes an important factor if scaling-up were to be considered. In Brazil, for example, planning an expedition is a long process that requires a lot of work and involvement on the part of participants (see Annex 1). If such an initiative were to be scaled up, volunteering time would have to be accounted for and eventually financial incentives may be necessary to acquire enough committed health workers. The distribution of tasks in a voluntary initiative is driven by the participants' area of interest, rather than by the best utilization of individual skills. In an institutional activity, distribution of tasks would first rely on mobilization of actual competencies.

4.4.2 Sustainability

In terms of health outcomes, Gruen et al. (21) demonstrated that irregular specialist visits in remote or rural areas have no real impact. Sustainability is possible only with a strong commitment at national and local levels.

Physical or virtual activities in developing countries are encouraged either by national or international charitable private funds and/or international contributions from governments. These external contributions raise the issue of sustainability, despite their institutional anchorage. In Rwanda, an important part of the sector is funded by international contributions: in 2006, 53% of the overall fund of the National Health Budget came from external donors (53).

Except when outreach activities are included in a national policy with strong leadership to maintain the activities over time, there is serious risk of early termination. Financing of private charitable activities is often problematic: funds come from various sources, and management of these sources is difficult because the resource flow often does not work well with the programme's timing and objectives.

Private initiatives must be encouraged because they often show the way forward by innovative approaches. However, relying on such private initiatives is not sustainable when it comes to implementing a long-term solution to a persistent problem. When private initiatives allow solutions that would be difficult to set up because of institutional constraints, these initiatives could find support through regular funding mechanisms. It would be a mistake to consider that outreach activities launched by the private sector can become sustainable only if they are embedded in publicly funded activities: they can be equally sustainable when the private sector considers such initiatives as part of its regular activities.

4.4.3 The technological challenges

As mentioned before, developing countries have to face some technological challenges when dealing with telemedicine. ICT presents opportunities to improve the population's health status, but the technological environment remains a bottleneck.

In fact, general problems of Internet connectivity, interoperability or access to infrastructure can minimize the benefits of outreach strategies. Costs associated with technology can also be a barrier. Furthermore, health technology requires human capacity to use it, which means training.

In Rwanda, where different telemedicine-based programmes have been launched, the problem of interoperability is challenging. This issue is not specific to developing countries: in Canada, the main challenge of the Ontario Telemedicine Network remains the use of technology and associated costs (29).

4.4.4 Political will

Experiences show that national support is a factor for success. Conversely, lack of support can be a threat. In Uganda, surgical camps were initially supported by the Ministry of Health, but the scarcity of financial resources has prevented regular activity. In Rwanda, the eHealth network has been successful thanks to the strong commitment of the Government.

In the long term, if we consider that outreach services can efficiently close the gap of access to health care in rural and remote areas, it will be crucial to develop a framework for regulation. The mobilization of health professionals requires strict planning at national level; cooperation with decisional bodies is then essential to mobilize resources efficiently.

5. DISCUSSION

5.1 INTEGRATION OF OUTREACH SERVICES INTO THE GLOBAL HEALTH SYSTEM

As described above, outreach initiatives bring many benefits for the local population and can be considered as one of the solutions to improve access to health care through better HRH mobilization.

Initiatives are often small-scale, either because of limited geographical scope or because they focus on a particular disease. In some countries, programmes started in one location have been extended to other regions because of their success, measured mostly through output and access indicators. This demonstrates that there is room for new modalities of service delivery to enhance access to care through better utilization of health workers.

Current trends of globalization and ICT development highlight the need to adapt health services to the changing environment, both in terms of demand and of resource mobilization for health service provision. This also means that it is not possible to work with the same organizational framework to meet all situations, because the global context is continuously changing.

Telemedicine and virtual services have a huge potential to increase the delivery of care in underserved areas. The demonstration of their economic value is still weak, but virtual services provide effective solutions for developing countries where transport and the availability of health workers are often inadequate. However, adopting new technologies also entails accepting a redistribution of the care delivery process: the ways HRH contributes to health-care services will have to be rethought. It is therefore essential for health workers to have adequate incentives to adopt practices supported by new technologies. In the case-studies in the annexes, different ways to finance HRH are presented: benefits, supported by the central hospital or by

the Government; direct financial incentives; performance-based financing, etc. Although evidence is weak from the case-studies presented, it indicates that multiple combinations of approaches are more likely to achieve results than strategies that focus on a single aspect. This is consistent with documented findings on financial incentives (52). The case-studies also indicate that the very specific context in which solutions have been elaborated lead the nature of the approach. In all cases, results are possible because there is active participation of health workers, who remain the key to success.

Mobilization of health workers as part of health-care provision cannot be considered without a renewal of financing models and organizational frameworks. When thinking about which model of health services can better serve the rural and remote areas, it is vital to consider how health workers can be involved in those services. Part of this involvement can result from social mobilization by giving high value to activities in favour of remote populations, either when delivering direct care or when supporting front-line workers. If mobilization is essential to start the activity, its long-term sustainability will rely on effective incentives. These incentives are not different from all those already used to mobilize health workers. It is just a matter of linking the appropriate incentive to the specific working conditions related to outreach services. Discrete choice experiments would certainly help understanding which incentives are the most effective.

The responsibility of policy-makers should not be underestimated, because they play a critical role in putting in place the conditions for an effective outreach programme. These conditions will affect the way HRH are mobilized in response to priority health challenges. The use of outreach services should then be considered as part of a multi-pronged response to a lack of access to care.

5.2 HOW OUTREACH SERVICES CAN INVOLVE HEALTH WORKERS IN UNDERSERVED AREAS

Globally, one of the overarching positive benefits of outreach services is the reduction of professional isolation for front-line workers. When interventions are fully implemented and clearly defined, they also participate in reducing the workload of front-line workers. In particular, technologies such as mHealth can also further reduce health workers' workload, enabling their interaction with the community to be more effective. The working environment can influence the level of productivity of health workers. If front-line workers feel that higher authorities recognize the value of their work, this can have a positive impact on their productivity. Furthermore, capacities may increase by sharing experiences with other health professionals and by receiving effective supervision. Well-designed outreach services may contribute to the retention of front-line health workers.

Conversely, it is more difficult to measure the role played by health professionals working remotely to support front-line workers. They are essential for supporting the front line. A telemedicine network, for instance, cannot function without somebody running, maintaining and supporting it, as well as ensuring follow-up. The mobilization of these support workers is rarely taken into account. There is a need for further research on the essential support activities, which will require time. It is, therefore, important to begin thinking how support activities can be included in the tasks of hospital-based HRH. Although little has been documented, the absence of support to HRH in underserved areas is probably a leading cause of the limited development of telemedicine. Once the excitement of participating in an innovation has passed, health workers have to choose between their activities: generally, the ones that are beneficial for their careers and are the best paid will be preferred over those that are considered to be optional.

In Rwanda, medical outreach visits are an integral part of district hospital functions and linked to performance. A limited number of visits and low quality of care discredit the work of a district hospital, and consequently reduces its monetary allocation. Health workers are thus motivated to participate in the outreach scheme, because their revenue depends directly on its success.

Similarly, the RAFT network is not mobilized at its full potential, because providing a second clinical opinion generally requires a lot of time and is not paid for. This explains why participation is quite low even though available technology should encourage increased activity.

Although countries do not all have the same ratio of health workers to population, they all face some type of shortage that may generate tension for HRH mobilization. This is why it is important to increase the productivity of the health workforce. Outreach activities can be considered as a form of task shifting, an aspect that is not explored in this report. When it is possible to send messages to patients and convene them more effectively, the health professional's workload can be focused more on actual care. The strong connection between the front line and referral support can increase front-line health workers' effectiveness.

Outreach can be a part of strategies to attract health workers to underserved areas and retain them there. Obviously, such strategies complement others that make work in underserved areas more attractive. When it comes to mobilizing specialized health workers, outreach activities may be very effective in bringing health workers to the population, but such approaches must be considered on a case by case basis; the scarcity of HRH may be in favour of having patients travel to dedicated places. Different approaches may be combined so that the burden of travel is shared. The productivity of health workers and the effectiveness of the activities should guide decisions.

6. CONCLUSION

Outreach health services connect different levels of the health system and strengthen the cooperation between them through a better utilization of the health workforce: they are not a solution on their own, but should be considered as part of it. In each country, all elements should be considered to assess the cost-effectiveness of such a solution and to build it up in a sustainable way. At a certain point, access to health workers may be very expensive and a political decision needs to be made according to the level of priority given to equity in access. The willingness to increase access to health workers in remote and rural areas results from a national political commitment to equity, while, in most cases, service delivery in remote places is costly and can only partially respond to health needs. Health services alone cannot always cope with geographical and economic barriers. In Brazil, for example, the size of the territory and the living conditions of Indigenous communities require multi-sector mobilization: air transport, the Army, local authorities, etc. In Niger, the distance and the poor communication infrastructure explain why only one of the country's eight regions has developed outreach health services. Outreach services can improve access to health workers, but they cannot respond to all situations, especially in poor countries where the financial cost of such services would be unbearable.

The infrastructure situation in Africa and frequent monopoly in the telecommunications market are the greatest obstacles to the implantation of virtual tools (eRadiology, videoconference, patient simulator, etc.). The growing contribution of international technology companies in health and the action of governments to liberalize the market could overcome the weakness of the African situation. The great challenge today remains both to attract more telecommunications companies to the developing world and to favour the creation of national companies on the model of large leading mobile telephone corporations.

The development of the third generation (3G) wireless technologies can provide a partial response to this challenge. The 3G system allows for significant improvements in sending and receiving videos, audio files and images: eRadiology, videoconferencing and all virtual tools could use this technology.

The combination of physical and virtual approaches is certainly a hint of future trends. The challenge will be to avoid favouring outreach solutions when permanent posting is possible: efforts to make better use of outreach activities should complement efforts to increase the attractiveness of currently underserved areas. Providing care to the population is not only a technical interaction, it is also a social bond that can only exist through personal relations between the community and its health workers.

This report does not intend to provide a definitive answer on the efficiency of physical or virtual outreach activities; it merely samples a variety of experiences showing the significant potential of such activities. Considering that each country consists of a particular combination of level of resources, physical environment, availability of HRH, health system organization, etc., it is obvious that "one size fits all" solutions are unrealistic and should not be considered. Lessons from the outreach experience in low-income countries having to face the biggest HRH shortages can guide policy-makers.

The limited expansion of outreach activities indicates their constraints. In other words, nothing can support a policy option that would rely only on outreach activities instead of attraction and retention of health workers in remote and rural areas. Front-line health workers are vital for populations to access care. They can be community health workers, nurses, GPs, etc., depending on the availability of HRH, the size of population to be served and the geographical distribution of the community in relation to communication networks.

Front-line workers need to receive all possible support to be attracted to and retained in rural and remote communities. Outreach services can play a significant role in retention strategies by improving competencies and job satisfaction. Whatever the nature and modality of services, front-line workers will benefit from advice and support provided by health workers located in urban settings. Technology is no substitute for human support, but it can have a large positive impact on the productivity and competencies of personnel in the field.

The overview of the case-studies provides a feeling of untapped potential, mostly because the service delivery models have not been fully explored. As a consequence, there is limited evidence to measure the efficiency of different approaches to better use the HRH as a very scarce resource. It will be important to invest more into research to assess and pilot new delivery models that make better use of front-line workers, benefiting from those located in cities, either within the country or abroad.

Electronic technology, including mHealth, is in its infancy. Solutions that can be developed in OECD countries to offset the absence of front-line health workers in very remote and low-density areas with virtual visits are not universally applicable. In most countries, these perspectives should not reduce the urgency of addressing isolated populations' health-care needs. Solutions must now be adopted using the latest affordable technology; the rapid pace of innovation should not be an excuse for inaction. Available processes and technologies can improve the situation of access to care in remote areas dramatically. Let us act.

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<http://www.amref.org/what-we-do/create-healthy-communities/nomadic-populations/>

CISCO
http://www.cisco.com/web/strategy/healthcare/connected_health.html

Expedicionários da Saúde, Brazil
<http://www.expedicionariosdasaude.org.br/>

Goroka General Hospital: Rural Outreach Services

MD Consult (brings the leading medical resources together into one integrated online service)
<http://www.mdconsult.com/>

Réseau en Afrique Francophone pour la Télémedecine (RAFT)
<http://raft.hcuge.ch/>

Science Direct
<http://www.sciencedirect.com/>

Siemens: Sanjeevan Mobile Health clinics

Social Science Research Network
<http://www.ssrn.com/>

Swiss TPH: Health Technology and Telemedicine
<http://www.swisstph.ch/?id=99>

US doctors for Africa: Project Mobile Clinic Africa
<http://www.usdfa.org/index.cfm?views=aboutus>

Voxiva Inc.
<http://www.voxiva.com>

**ANNEXES
PHYSICAL OUTREACH
SERVICES**

ANNEX 1

Mobile surgery for the Indigenous people of Brazil

COUNTRY. Brazil.

PROJECT. Mobile surgery for the Indigenous populations.

Context. Around 220 000 Indigenous people live in scattered communities throughout the Amazon region of western Brazil. Due to living conditions (jungle, weather conditions, lack of road networks), there is a significant dearth of health-care professionals in this area. Consequently, a large majority of people have no access to health centres.

Since 2004, the nongovernmental organization Expedicionários da Saúde, based in Campinas (Province of São Paulo), has put in place a project aimed at delivering surgery services to Indigenous populations. The association is linked with the medical and technological universities.

Other disease-specific organizations carry out similar activities. Expedicionários da Saúde has a partnership with Saúde e Alegria in Rio Tapajos, undertaking annual short-term expeditions in Abaré in the hospital boat.

Objective. To provide surgical treatment to Indigenous populations within the State of Amazonas using a portable surgical centre. Three main medical specialties are available: ophthalmology, general surgery and anaesthesia. The health service aims to complement local health policy: it prevents the unnecessary displacements of Indigenous communities to health-care facilities located far away.

Staff. The number of medical personnel staffing an expedition is dependent on the number of projected surgical cases determined during planning. Participants come from the Province of São Paulo, Campinas, Sorocaba, Piracicaba and other cities, where they work in public and private hospital or clinics, to complement local doctors. The expedition team is usually composed of physicians who have already participated in previous expeditions.

The participants are usually recruited from professional medical associations. Beginners fill in an online form for their technical and personal capacities to be assessed. Those selected are trained by anthropologists and members of local nongovernmental organizations on the living conditions of Indigenous communities.

All team members are volunteers; 80% have less than 15 years' experience. Specialists and paramedical staff participate in expeditions in their spare time. Each expedition is followed by a satisfaction questionnaire, and feedback is used for subsequent missions.

Activities. During eight days, the teams perform 200 surgical operations and 1500 clinical procedures in four-hour shifts over an average 12-hour working day. Most surgery is ophthalmic (cataract and pterygium) or for hernias, although many other interventions have been done, such as

emergency caesarean sections and a variety of orthopaedic and other minor surgeries. When a case is too complicated, the organization transfers the patient to the best partner hospitals in São Paulo.

In 2004, the team launched the first expedition via linkage to the Sanitary District of the Indigenous Population and Federation of Local Indigenous People. Since then, the project has carried out 13 expeditions, including eight along the Amazon River. Currently there are three expeditions a year, in mid April, mid August and late October.

Follow-up is assured by the National Foundation for Health Care (FUNSA) and the government organization responsible for providing health care for the Indigenous population.

PLANNING AND EXECUTION

- 
- *Six months before* the expedition: select an area. Start local arrangements (information, personnel, lodging, transport and food supplies to medical staff). Contacts are made with the mayors to ensure further collaboration. A site survey is undertaken to select the site for the installation of the Mobile Surgical Centre and to establish partnerships, tasks and responsibilities for the upcoming venture.
 - *Three months before* the expedition: a medical team is sent to provide training for the local volunteers and designated health personnel.

This local team will spend the next two months around the selected area to identify and notify patients, according to the team's capacities.

Final planning phase

- *Fifteen days before* the expedition: send two experienced logistics personnel to the central depot in Manaus. Preparation for the arrival of the consumables from Campinas and final procedures for delivery of the cargo to the final location.
- *Four days before* the expedition: the cargo is ready and in place for the final leg of transport.

Once situated, the entire equipment can be assembled in about two working days.

- 
- *One day before* the expedition: the experienced volunteer medical staff, selected from top São Paulo State hospitals, fly to the airport nearest to the site. From there, the only way to reach the site often necessitates a speed-boat ride up river of five or more hours.

On the first day, the surgical centre is open and ready to perform, generators are in operation, tents have been assembled and fully sanitized, the clinical offices are all set and the pharmacy is fully loaded. A Wi-Fi network is implemented as the patients start to arrive.

RESULTS

Tables A1.1 and A1.2 give details of the surgical and clinical procedures performed so far.

TABLE A1.1. Specialized health outreach in Brazil's Amazon region

Location	Main ethnic groups	Date	Duration	Medical visits	Surgeries
Lauaretê, AM	Tukano, Tariano, Desano, Piratapuia, Arapaso	February 2004	15 days	109	52
		November 2004	15 days	155	87
		April 2005	15 days	166	66
Pari Cachoeira, AM	Tukano, Tuyuka, Desano, Hupda	November 2005*	15 days	672	128
Tunuí, AM	Baniwa	April 2006	8 days	438	120
		November 2006	8 days	688	135
Pari Cachoeira, AM	Tukano, Tuyuka	April 2007	8 days	618	106
Tapajós, PA	Pop. Ribeirinha	August 2007**	5 days	116	66
		November 2007***	7 days	1 296	225
Vila Nova, AM	Baré, Werekena, Cubeo	April 2008	7 days	935	194
Arapuins, PA	Pop. Ribeirinha	August 2008***	5 days	315	132
Novo Paraíso, AM	Ticuna	November 2008	7 days	1 454	195
		April 2009	7 days	1 391	296
Total				8 353	1 802

* First expedition with portable surgical centre.

** Alternative expedition exclusively for ophthalmological assistance.

*** Expedition in association with Saúde e Alegria with portable surgical centre and Novo Hospital Abaré.

Source: Expeditionários da Saúde documents.

COSTS

The total cost for each expedition varies widely depending on the region, type of transport and team size.

Table A1.3 shows all the costs for the latest (April 2009) expedition to Novo Paraíso, near the borders of Colombia and Peru. This work was made possible through partnerships with institutions (both local and national) and private donors. According to the expedition planners, this mobile solution is preferable to health worker retention strategies, in view of the low population density.

These are the estimated data of the April 2009 expedition, in which the team performed 296 surgeries at an average cost of € 380 per surgery and 1391 clinical procedures at an individual estimated cost of € 27. The numbers are not exact, as most of the expedition cost was donated or obtained from private sources or government agencies. The cost of medical supplies was estimated at street prices, but supplies are often obtained free or at considerable discount from vendors. Air transport of cargo and personnel was provided by the Brazilian Air Force, and the local building infrastructure was provided by the Indigenous communities and FUNASA. Fuel for boats and generators was provided by FUNASA; several boats were provided by the municipality, etc.

The non-medical costs associated with transport (including transport for patients) and training are important: they represent around one third of the total amount, due to

the geographical situation of the project's activities. Moreover, these costs do not include the opportunity costs of the staff employed for the expedition. A recent correspondent's diary mentioned the goodwill of the medical volunteers using their free-time to participate in the expedition (1).

To be more objective, it would be interesting to calculate the travel costs for patients to the closest public hospital. Surgeries for hernia and cataract (the main operations), which are covered by the national health system,¹⁶ can be undertaken at the closest health structure located in Tabatinga, on the border with Columbia and Peru. It is difficult to establish the time needed to arrive at this facility, taking into account the low frequency of river boats (one per week), costs and the various geographical origin of the patients (some of them come from beyond the border). In any case, the distance, the difficulty to reach the structure and the cost of transport represent barriers to accessing health care in this way.

Administration costs can also be reduced if the team itself is in charge of the fund management.

¹⁶ The national health system of Brazil offers free and universal access to health care.

TABLE A1.2. Number of surgical and clinical procedures performed since 2004

Date	Location	Surgical interventions	Clinical procedures
February 2004	Iuaretê – AM	52	109
November 2004	Iuaretê – AM	87	155
April 2005	Iuaretê – AM	66	166
November 2005	Pari Cachoeira – AM*	128	672
April 2006	Tunui Cachoeira – AM	120	468
November 2006	Tunui Cachoeira – AM	135	1 531
April 2007	Pari Cachoeira – AM	106	618
August 2007	Abaré Hospital Ship	56	225
November 2007	Abaré Hospital Ship	225	1 296
April 2008	Vila Nova – AM	195	894
August 2008	Abaré Hospital Ship	132	315
November 2008	Novo Paraíso - AM	195	1 454
April 2009	Novo Paraíso - AM	296	1 391
TOTAL		1 793	9 294
Average		138	715
Median		128	618

Source: <http://www.expedicionariosdasaude.com.br/>

BENEFITS

- Indigenous communities have access to primary health care without travelling to the nearest hospital, saving time and expense. The population experiences a significant improvement in quality of life.
- A mobile clinic represents a good strategy for retention of health professionals in the Amazon region, as it provides training for local health workers and combats the feeling of isolation. Furthermore, the timely care of the population by an outreach service reduces the costs of medical care, as costs associated with preventive care are usually lower than those associated with treatment.

CHALLENGES

1. Planning

The planning is long and difficult, as described above, due to the specificity of the mission in the Amazon River area.

2. Transport

There is no road network, so the main mode of transport is by boat. Speed-boats are capable of carrying up to 10 people at over 60 km per hour, but slower boats that carry over 150 people can only travel at a maximum speed of 15 km per hour. This means that the effectiveness of the mission is largely dictated by the river basin and climatic conditions in the selected areas. The range of influence of the mobile clinics typically extends some 200 km up and down the main river, but it is not unheard of for patients to travel as far as 500 km to obtain assistance from the team.

3. The local team

The current capacity of the medical team is about 300 surgical interventions and 2000 clinical procedures. The role of the local team is crucial in ensuring that patients, who may often have covered very great distances, are not turned back at the last moment because of the complexity of the intervention they require or because of their lack of need. The local team's work fosters the population's trust in the intervention and the medical team that carries it out.

4. Patients and their families

Patients do not arrive directly at the Surgical Centre, but stop at selected partner Indigenous communities located no more than 5 km away, where they are fed and lodged by their relatives while waiting for their consultation.

Indigenous people never travel alone, but always with their parents, spouse and children. This is logistically difficult because the team has to provide food and lodging not only for the patients, but also for their families. Sometimes over 800 meals have to be served daily, which requires huge logistic capacity.

TABLE A1.3. Costs of the expedition to Novo Paraíso, April 2009

Phase	Description	Duration	Cost (€)
Preparation	Includes office and depot rentals, staff and maintenance costs, trips for location selection, personnel screening and training and final assessment of the location	6 months	40 000
Mobilization	Includes equipment and supplies transport to the site and installation	15 days	10 000
Operation	Includes operation of the surgical centre, transport of medical staff, lodging and food for staff and patients, patient transport, boat rental and fuel	8 days	30 000
Demobilization	Includes packing the equipment and left-over supplies and their transport back to storage	4 days	5 000
Follow-up	Includes measurement of indicators related to patient health and social conditions up to six months after intervention	6 months	10 000
Supplies	Includes all medical supplies (including drugs) directly related to the clinical and surgical procedures	8 days	40 000
Depreciation	Includes equipment maintenance and replacement	6 months	15 000
Estimated total cost of the expedition			150 000

Source: <http://www.expedicionariosdasaude.com.br/>

5. Communications

A major issue is the lack of efficient and real-time communication, not to mention other related resources such as telemedicine and the Internet. The main means of communicating with the outside world is often a high-frequency radio or satellite telephone. Much needs to be done in this area, especially to manage better the patients' inflow and outflow of ships.

6. Follow-up

Follow-up does not live up to city standards. In such a vast territory with a population density of less than 0.1 person per km², comprehensive follow-up to treatment would be very costly and time-consuming.

RECOMMENDATION

It is necessary to push the mobile clinic strategy forward to a larger scale, mobilizing health professionals from cities in the Amazon region that would enable the reduction of transport costs.

1. The Amazon's Indigenous people: the other Brazil The Economist, 20 November 2008; The Amazon: into the wild. The Economist, 12 December 2008 (available at: http://www.theelectronicconomist.com/research/articlesBySubject/displaystory.cfm?subjectid=7933598&story_id=12749564, accessed 17 June 2010).

ANNEX 2

Gisenyi District Hospital in Rwanda

COUNTRY. Rwanda.

PROJECT. Gisenyi District Hospital outreach to rural patients.

Context. Rwanda is a landlocked country of 26 338 km² with an estimated population of 9.2 million. With 350 people per km², it is the most densely populated country in Africa. It is estimated that 57.5% of the population is below 20 years of age; overall life expectancy is 51.4 years.

Per capita real gross domestic product (GDP) grew from US\$ 235 to US\$ 291.30 between 2002 and 2008. However, this level of GDP per capita (<US\$ 500) places Rwanda as one of the poorest countries in sub-Saharan Africa. Poverty is widespread, affecting 57% of the population, while 37% lives in abject poverty.

Much progress has been made in the health sector in the last five years (2005–2009). The infant mortality rate decreased from 86 per 1000 live births in 2004 to 62 per 1000 live births in 2008, and the under-five mortality rate declined from 152 to 103 per 1000 over the same period. If this decline is maintained, Rwanda will meet the child mortality Millennium Development Goal (MDG) by 2015. In contrast, maternal mortality remains high at 750 per 100 000 live births, far from the MDG target.

Considerable success has been made in combating AIDS and malaria. The prevalence of HIV was 2.8% in 2008, one of the lowest rates in sub-Saharan Africa. The number of severe malaria cases fell by 32.3% between 2006 and 2007. However, these two diseases still place a significant burden on the health system, and in 2008 they, along with HIV/AIDS-related opportunistic infections, accounted for 35% of hospital mortality cases.

Health workforce. The population should have access to a health facility within one hour's walking distance; however, the World Bank's 2009 country status report found that approximately 23% of patients still had to travel more than one hour.

Reforms and initiatives since 2005 include the decentralization of HRH management and the introduction of performance-based incentives. There is now one medical doctor per 18 000 people and one nurse per 1700 people, whereas in 2005 only 30% of health facilities met the minimum prevailing staffing norms. The number of community health workers (CHWs) has been scaled up from 12 000 to 45 000, and their tasks have been expanded.

To face the shortage of medical staff and deal with imbalance (internal brain drain) the government has decided that graduating doctors are obliged to serve in district hospitals

for two years, otherwise they cannot find employment easily in the public sector (i.e. bonding contracts for young medical professionals). In addition, district hospital selection is random: hence everyone is offered the same chance to choose a district hospital.

The Rwanda Ministry of Health and its partners developed and installed iHRIS Manage, a web-based human resource management system designed to meet the Ministry's immediate data collection needs. The system indicates which district hospitals are facing human resource shortages and from where they can be recruited, and it helps to inform the design of a human resources policy.

Activities. The district hospital in Gisenyi town (the third largest city in Rwanda) is a secondary health-care facility with 300 beds and 11 general practitioners. The entire population covered by the district hospital and the eight primary health-care centres under its supervision was estimated at 303 549 in 2008.

At least once a week, all remote health facilities are visited by a medical doctor so as to treat and/or transfer complicated cases and discuss with nurses when and how patients should be referred to higher levels. These visits also provide an opportunity to discuss counter-referrals, which are good case-studies because they identify weaknesses and strategies for improvement. The visiting medical personnel emphasize maternal and child health by checking that guidelines are well used, and they also assist nurses in practical activities such as normal deliveries.

All HIV/AIDS cases attending consultations are seen by a physician for follow-up. To make sure health-related MDGs are taken into serious consideration at all levels, indicators related to HIV/AIDS, malaria, and maternal and child health have been linked to performance. This raises the awareness of doctors performing outreach activities, which should maximize their performance.

A mobile telephone network is in place between the district hospital and the eight health centres, and the ambulance is on the same network to facilitate patient referral coordination.

Permanent remote assistance for health-related problem-solving and decision-making is available between doctors and health centres, allowing for early referral of complicated cases. Referral of complicated labour is a very important strategy in infant and maternal mortality reduction. While waiting for the ambulance, the hospital team is briefed so that it is prepared when the patient arrives.

Incentives. Monetary compensation constitutes the main incentive for the health workforce to perform outreach

activities, as they benefit from both direct and indirect financial advantages.

The Rwanda Ministry of Health, in collaboration with the Rwanda Medical Association, has been putting in place *housing facilitation*, which includes easy access to housing loans for physicians working in district hospitals and distribution of plots in the capital city for all physicians.

Outreach health services by physicians in remote facilities are one of hospital performance-based financing indicators. These are non-compulsory tasks for physicians, because they have a direct link with their bonus (as internal contractors). *Performance-related bonuses* can raise salaries by up to 60%, depending not only on how the hospital has performed but also on the performance of an individual. The latter is an internal contract between personnel and the hospital: it is aimed at improving individual behaviour.

Education and regulatory interventions. Access to postgraduate studies is granted to physicians who have worked at least two years in a district hospital. The Ministry of Health signs contracts with medical students before they start their last internship. The contract includes several advantages: a monthly salary of up to five times the current scholarship for the whole period of their internship, access to public medical insurance, and contribution to a retirement fund. The interns accept to practise in district hospitals for a period of two years, after which they are free to pursue their careers wherever they want. The fact that the Ministry of Health is taking care of future doctors at an early stage is an effective incentive.

Management, environment and social support. Almost all district hospitals have access to electricity, the Internet and a mobile telephone network. Telecommunication is an incentive because it allows people to remain up to date and to communicate with families and loved ones, and it reduces the fear of isolation.

FUNDING

Logistics needed for outreach activities include: doctor's bonus, ambulance driver's bonus, fuel and telecommunication fees. As primary health care is of great concern in Rwanda, 25% of the total performance-based hospital budget has been allocated to outreach health activities in health centres. This demonstrates the importance of primary health care, as stipulated by WHO.

RESULTS

Although no impact evaluation was carried out at the local level, some overall trends were discernible the following year:

- The number of referred patients had decreased considerably.
- Referred patients were received at earlier stage of the disease.
- Consultations in health centres increased as the population began to have more trust in health facilities attributable to the regular presence of a physician.

The high level of community health insurance coverage (85% in 2008) is another explanatory variable that should be kept in mind.

Benefits for district hospital doctors include: an increased awareness of primary care challenges, a rise in their revenue, and better coordination of clinical activity.

On the aggregate level, between 2001 and 2004 the rate of curative care increased from 0.22 to 0.55 visits per person in provinces with performance-based financing, compared with an increase from 0.20 to 0.30 visits in provinces without performance-based financing. Institutional deliveries almost doubled (from 12% to 23%) in pilot provinces, while the same indicator increased from 7% to 10% in provinces with traditional input-based payment (2).

STRENGTHS AND WEAKNESSES

Strengths of the outreach programme are:

- Performance-based financing was integrated into the national health policy. It is also being applied to Ministry of Health staff, and another model is being developed for community health workers.
- Health service decentralization, on which much effort has been made, is another factor in favour of sustainability and efficiency. It reduces bureaucracy and allows stakeholders and decision-makers at the local level to adapt the health policy to their context.
- District hospitals are held accountable for health outcomes in health centres. Therefore, district hospitals have an incentive to monitor and assess the performance of health centres. Moreover, decentralization allows them to perform top-down reforms (innovations) to improve performance.

As with every reform, the system has weaknesses that need to be addressed:

- What will happen to outreach health services once donors stop providing the performance-based financing?
- Another concern is data reliability: health professionals may have an incentive to inflate data so as to maximize performance. This issue should be addressed by monitoring and evaluation teams.
- Is there a threshold effect – a maximum level of performance – and, if so, what happens once this level has been reached?
- As these measures concern mostly young physicians, outreach activities do not benefit from the input of more experienced health professionals and specialists.
- Services that are not being rewarded may become neglected.
- Time spent on data collection could be spent on treating patients.

LESSONS AND PERSPECTIVES

- Political will is key to the success of this policy.
- The fact that Rwanda is a small country facilitates not only monitoring and evaluation of the whole process but also infrastructure maintenance and telecommunications, which would be more difficult

in large countries with infrastructure problems. Thus, innovative home-grown solutions should be encouraged.

- Sophisticated technology is not always needed to solve all health-related constraints. Simple solutions such as mobile telephones can be very useful (management matters, not only resources).
- Whatever the challenge facing health systems, there is no excuse for not trying to solve human resources shortages in rural areas.
- It has been suggested that “in settings where Government leadership is not strong or the ability to design and implement effective national public systems on a large scale in a relatively short timeframe is weak, pay for performance solutions may generate better and more rapid results. In other settings, where the Government is strong and their ability to implement publicly managed systems is reasonably good, it may be feasible to implement managerially imposed and publicly installed solutions” (2).

RECOMMENDATIONS

- Design health policies that allow specialists to participate in outreach health activities.
- Improve management and management support systems: career paths, management information systems and human resource strategy.
- Strengthen community participation: support and oversight from local communities may increase responsiveness and effectiveness of health workers.

1. *Performance incentives for global health: potential and pitfalls*. Washington, DC, Center for Global Development, 2009.
2. Eichler R. *Discussion paper for the First Meeting of the Working Group on Performance-Based Incentives*. Washington, DC, Center for Global Development, 2006.

ANNEX 3 Project 1816 in Viet Nam

COUNTRY. Viet Nam

PROJECT. Project 1816

Context. Health services in Viet Nam have improved in recent years. However, the quality of medical treatment is still limited, especially in mountain areas, because of a lack of qualified health personnel. Viet Nam is facing a common challenge: the unequal distribution of qualified health workers among regions and between rural and urban areas.

Staff. The majority of health professionals are concentrated in urban areas such as Hanoi and Ho Chi Minh City, while rural and mountainous areas are short of doctors. People in different regions have different accessibility to high-quality medical services. Table A3.1 shows the distribution of doctors and beds in the Vietnamese health service. The ratio of doctor:sick-beds in private hospitals is twice as high as that in public hospitals. The distribution of doctors is further refined according to their level of qualification in Table A3.2.

There is a particular shortage of specialists in tuberculosis, leprosy, mental health, paediatrics, cancer, etc. and a serious dearth of highly qualified doctors in general hospitals and district hospitals.

Objectives. In order to rectify the uneven distribution of health professionals, on 26 May 2008 the Minister of Health of Viet Nam approved Project 1816, in which qualified health staff in high-level hospitals would be assigned on rotation to low-level hospitals to help improve the quality of medical treatment. The three main objectives of Project 1816 are:

- Enhancing quality of medical treatment in low-level hospitals, in particular in mountainous areas that are short of health staff;
- Reducing the overload status of the central hospitals, specially national-level hospitals;
- Transferring technology and providing training to improve capacity of local health staff.

The rotational assignment has an important role in improving medical treatment in the community and in ensuring equity of health-care services among regions

TABLE A3.1. Distribution of doctors and beds in the medical service system in Viet Nam

Resource	National level N=34	Provincial level N=274	District level N=560	Other sectors N=21	Private hospitals N=65	Total N=954
Sick-beds	14 650 9.9%	72 889 49.4%	51 248 34.8%	3 655 2.5%	4 985 3.4%	147 427 100%
Doctors	4 486 13.2%	16 138 47.8%	10 018 29.6%	962 2.6%	2 292 6.8%	33 860 100%
Doctors:sick-beds	1:3.3	1:4.5	1:5.1	1:3.8	1:2.1	1:4.4

Source: Report of 954 hospitals in 2008.

TABLE A3.2. Distribution of highly qualified doctors in the medical service system in Viet Nam

Qualification	National level N=34	Provincial level N=274	District level N=560	Other sectors N=21	Private hospitals N=65	Total N=954	Percentage
PhD	268	163	3	27	80	541	1.4
Masters	1 179	1 775	218	170	353	3 695	10.9
Special level 2	399	894 5.5%	88 0.8%	58	155	1 594	4.7
Special level 1	1 062	5 827 36.1%	3 331 33.2%	296	657	11 137	32.8
Doctor	1 578	7 479	6 378	411	1 047	16 893	50.2
Total	4 486	16 138	10 018	962	2 292	33 860	100

Most regions are short of doctors, especially in mountainous provinces and remote and isolated areas. For example:

- Lai Chau province: in 2004 there were 86 doctors, of whom 7 worked at commune level and 15 at district level; in 2007, there were no doctors at commune level.
- Hoa Binh province: in 2004 there were 928 doctors; but only half this number in 2007.
- Kon Tum province: in 2004 there were 404 doctors, but only 199 in 2007.

and between urban and rural areas. Moreover, it helps to develop human resources at local levels.

RESULTS

After one year of implementation, 59 hospitals (central hospitals and hospitals in Hanoi, Hai Phong, Kien Giang, and Ho Chi Minh City) have:

- assigned 1846 qualified health staff to support 189 low-level hospitals in 57 provinces;

- transferred 608 techniques (26 specialties) and conducted 295 training courses for 11 978 trainees;
- provided treatment to 70 434 patients;
- implemented 1882 surgical interventions;
- reduced approximately 30% referral cases.

At provincial level, around 30 provinces and cities have assigned 635 health staff to 184 district-level hospitals and 294 health stations.

FUTURE DIRECTION OF WORK

- Develop a uniform procedure for transferring techniques from high-level to low-level hospitals.
- Continue to implement Project 1816.
- Continue to assign health staff from high-level hospitals to lower-level hospitals (national to provincial; provincial to district; district to commune).
- Develop legislation documents to support Project 1816.
- Enhance the monitoring, surveillance and supervision of Project 1816 implementation.
- Adopt a regular reporting system.

ANNEXES

**VIRTUAL OUTREACH
SERVICES**

ANNEX 4

Réseau en Afrique franco- phone pour la télémédecine [Telemedicine network in French-speaking Africa]

COUNTRIES. French-speaking African countries.

PROJECT. Réseau en Afrique francophone pour la télémédecine (RAFT).

Context. Activities in low-income African countries.

Objective. To support health-care professionals in remote and rural areas in Africa.

Activities. The project is based on establishing a coordinated network in the different countries. Usually the local team is composed of three people: the focal point, who is a medical authority initiating and supporting the project in liaison with the national authorities; the medical coordinator, who is responsible for interaction with the users and in particular for identifying the needs in continuing education, finding experts and assessing the results of the network's activities; and the technical coordinator, who is in charge of the good functioning of informatics tools.

At present the network proposes two options:

1. *Continuing medical education.* Dudal, the tele-teaching tool, functions with low band-widths (25 Kb/s). A committee of lecturers selects the schedules according to their relevance and their potential impact on practice in isolated areas. A discussion follows each intervention. Physicians are the most concerned, but the network aims to encompass a broad scope of health professionals including, for example, midwives and nurses.

This activity is successful because it is mainly based on local demonstration and illustration responding to the health needs. Indeed, 70% of the schedules are provided by local professionals.

2. *The tele-consultation tool.* iPath allows professionals to share virtual communities in order to collaborate from a distance on the patient case resolution: helping the diagnosis, offering a second medical opinion, and deciding on the follow-up of a patient or his evacuation to another hospital. The system concerns radiology, dermatology, surgical follow-up, infectious diseases, etc. This tool is reserved for professionals and experts identified by the RAFT local team.

There are different steps according to the different technologies that are available. The first level concerns the virtual community of experts discussing the clinical case with the submission of radiological images; at present, radiology techniques are deployed with distance gynaecological and radiological advice.

According to the connection, professionals can also participate in video-conferences with their colleagues.

The success of this activity is still weak due to the limited demand from professionals. The local team has a crucial role here: it cut short the waiting time of health professionals asking for referral support.

Incentives

The professionals are remunerated in a different manner according to their activities in the network. Contributors to the schedules benefit from academic accreditation attesting their involvement, so more and more professionals want to join the network. For those who give advice, two models have been put in place. The first depends largely on goodwill: the local team is recompensed for bringing together the applicants and the advice of the professionals. The second model is based on the fees paid by the patient who benefits from the tele-consultation (particularly radiology); part is transferred to those assuring the connection and part goes to those in charge of the patient (physicians, nurses or others close to the patient).

FUNDING

The network relies on mainly on external contributions. National governments have difficulty in covering the costs of Internet subscription, which remains expensive in Africa. Even if health professionals benefit from Internet communication, some will need to be trained to use the tools.

The Geneva University Hospitals have been involved in coordinating the development of a network for eHealth in Africa (RAFT), operating first in Mali and now involving 15 French-speaking countries. It is currently expanding to reach English-speaking and Arabic-speaking African care professionals. RAFT funds the projects for the first two years, after which the sustainability of the programme depends mainly on the local team. The team has a crucial role to promote and push forward collaboration with the authorities so as to assure the institutionalization of the programme.

Collaboration with WHO and the French-speaking Worldwide Digital University helps to extend local knowledge.

Costs

The main cost is that of the Internet subscription, the least expensive available option being US\$ 500 a month. The magnitude of this sum (according to purchasing power parity of the low-income countries) explains in part the difficulty in elaborating a sustainable economic model: the patients who benefit from the technology are not the

ones who pay the Internet subscription. University hospitals can fund the subscription. In Niger, the situation is worse: the local team is managed by the health authorities but they are incapable of paying the cost of the communication.

BENEFITS

The network has had a wide success on the continent. It is expanding to the English- and Arabic-speaking countries. Institutional issues are less complex, particularly in English-speaking countries: the RAFT network connects directly with them.

The network is growing. Senegal has already acclaimed the RAFT network as a vehicle for distance medical education. Efforts in other countries and other activities should be developed.

STRENGTHS AND WEAKNESSES

1. The sharing of advice takes place directly among the identified experts but is also disseminated by the university hospitals to the local health structures, so it is important to establish local connection points. Satellite technology allows local professionals to pursue their continuing education based on local health needs and to obtain clinical advice from experts through tele-echography or eRadiology, for example. It is also useful for the logistic management and follow-up of patient referrals, and helps the local health professionals to feel less isolated (through contact with other professionals, family and friends living in the cities).
2. Maintaining well-trained and motivated health professionals in strategic places is of economic value for the health system.
3. The capacity to adapt knowledge to local situations contributes directly and efficiently to the wellbeing of local populations. A patient simulator is shortly to be put in place for contextualized decision-making and training. These e-technologies have a clear potential to respond to the health needs of isolated patients (1).
4. The sustainability of the system depends broadly on its institutional anchorage and the costs of its activity, particularly the Internet subscription rate which is decreasing very slowly.
5. The implementation and development of the cellular GSM, particularly the 3G, could be a good alternative with a low cost of subscriptions and tools, as it allows a faster image to be sent without requiring the infrastructure of an Internet connection.

1. Ayache N. *Quelle e-santé pour demain en Europe ? - de l'imagerie médicale au patient numérique [What e-health for tomorrow in Europe? - from medical imaging to the digital patient]*. Paris, National Research Institute of Informatics and Automatics (INRIA), 2008.

ANNEX 5

eHealth in Rwanda

COUNTRY. Rwanda.

PROJECT. eHealth Rwanda.

Context. Health information technology in Rwanda is a quickly growing industry with many stakeholders – the national government, several nongovernmental organizations and the private sector.

Objective. To integrate technology into the expanding health-care system.

Activities. Six health technologies are being implemented in Rwanda. The package of systems aims to respond to the health-care needs of the population and to improve management of the health system so as to gain in productivity. The first two programs in the following list are already operational.

- TRACNet: monthly monitoring of infectious diseases including HIV/AIDS, tuberculosis and malaria.
- CAMERWA: a drugs and medical supply management system handled by the national pharmaceutical company.
- Open MRS: an open medical records system that tracks patient-level data.
- Telemedicine: ICT used to deliver health services and health-care information and education to geographically separated parties.
- HMIS: health management information systems.
- e-learning for nurses.

In view of the prevalence of the AIDS epidemic in the country (210 000 cases in 2005), TRACNet was implemented by the Rwanda Ministry of Health's Treatment and Research AIDS Centre in 2005. The software was developed by VOXIVA Inc., using mobile telephone support thanks to a free dial number. It is a dynamic information system designed to collect, store, retrieve, display and disseminate critical programme information as well as to manage drug distribution and patient information related to treatment of HIV/AIDS. Today, all the 94 health-care facilities in the country offering antiretroviral therapy are linked, thus encompassing all the patients treated.

The data are transferred to CAMERWA, which manages the drugs and treatments, as well as Open MRS which is still in the implementation phase.

RESULTS

Thanks to the ease of transmission by mobile telephone and the low energy consumption using solar panels, the system reached 60 000 infected persons in 2007, compared with 8 000 who were documented in December 2004. Currently, all the medical data of people living with HIV/AIDS are computerized, allowing retrieval of up-to-date information no matter which health facility the patients attend. This is very important for patient follow-up, multidrug-resistant tuberculosis surveillance, etc.

FUNDING

In August 2009, the Government of Rwanda unveiled a US\$ 32 million plan to enhance eHealth through ICT. Of these funds, US\$ 7 million will be directed to developing ICT mechanisms to support district and health centre levels, and a further US\$ 6.3 million will go to strengthening hospital management information systems. Over US\$ 5 million will be used for epidemiological surveillance, telemedicine and computed radiography system installation in district hospitals. A further US\$ 4.5 million will be channelled into developing Internet-based infrastructure eHealth data and voice. Community based information systems will utilize a further US\$ 4 million, while the computerization of the national health-care system will cost US\$ 1.5 million.

Costs

So far, only TRACNet and its operability with CAMERWA are effective. The total cost of the TRACNet project over five years was US\$ 2.1 million.

CHALLENGES

- The different systems are still not interoperational because of the time needed to train all health-care professionals in HMIS and the adequacy of the different software.
- A paper-based and electronic system exists since 1997 to report the activity of health-care facilities, but Microsoft Access is not fully compatible with TRACNet. The various partners, with the strong commitment of the Government, are working to resolve the situation.
- The Government plans to overhaul the HMIS with the collaboration of OpenMRS. Its vision is to gather national data regularly for improved surveillance of all health indicators.
- The health services rely on simple technology and build on what already exists. Full implementation requires training and interoperability, but the first results are encouraging.

ANNEX 6 HealthNet in Nepal

COUNTRY. Nepal.

PROJECT. HealthNet Nepal.

Context. Nepal has one of the lowest gross national products – US\$ 300 per capita (1) – and one of the lowest literacy rates (50%) in the South-East Asia Region. There is only one doctor for 6000 people, and specialists are situated far from most of the population. These factors have contributed to the prevalence of communicable, respiratory and nutritional deficiency diseases, which are among the most common disorders seen in hospital outpatient departments. Telemedicine therefore offers a potential means of improving health in Nepal.

Objectives. To provide affordable Internet services to the Nepalese health community, access to health information, and technical support for various regional information-sharing initiatives.

Activities. The pilot telemedicine network was implemented from July 2004 to December 2006,³⁷ financed by the PAN Asia programme of the International Development Research Centre (IDRC), Canada. A software suitable for telemedicine in the context of Nepal was developed: the local system collects clinical history and images, which are then transmitted to a specialist for diagnosis.

The following hospitals referred cases for telemedicine:

- AMDA Hospital, Damak (eastern region).
- Siddhartha Children's and Women Hospital, Butwal (western region).
- Siddhi Memorial Hospital, Bhaktapur (central region).

Specialist advice was provided from the following central-level hospitals:

- Teaching Hospital, Tribhuvan University (Department of Radiology and Dermatology).
- Kathmandu Medical College (Department of Pathology and Department of Dermatology).
- Sahid Ganga Lal National Heart Centre.

The local hospitals were selected according to the size and location of the local population. The medical experts at the medical colleges and hospitals in the capital city were chosen because the doctors there had good knowledge of ICT and were willing to participate in the project.

Telemedicine was used for the purpose of general guidance, assessment of diagnosis, treatment and examinations. For the clinical history, both general and discipline-specific information are collected. The general information includes: patient information, basic information, personal history, past medical history and family history. Discipline-specific information is collected for pathology, radiology, dermatology and cardiology.

RESULTS

It was found that the availability of telemedicine increased the volume of teleconsultation and provided exposure to a rural community for the medical interns in colleges. It also provided continuing education for health professionals working in rural areas and reduced their professional isolation. All these factors improved the quality and efficiency of the health service. With the use of the Internet, access to the literature through WHO's HINARI system increased.

A study compared the baseline medical knowledge of primary care physicians with that of clinical experts: it was found that there was no difference in their diagnoses, which supports the view that textual information supplemented by images is sufficient for diagnosis.

The telemedicine system allowed primary care physicians to interact with medical experts. This also helped to reduce the professional isolation of health-care staff working in rural areas.

COSTS

An analysis was carried out to compare the cost of telemedicine with the cost of traditional methods of providing health-care services (Table A6.1). Only variable costs were considered. The cost charged by the remote site was approximately 50% less than the charge to be paid in city areas. However, the patient does not have to bear the cost of transport and lodging. The telemedicine service charge would be sufficient to cover the fixed costs and to pay the fees of the expert. Thus, only the cost of the expert's Internet connection would have to be borne by the remote centre. It is too early to calculate all the costs (both fixed and variable) in order to estimate whether telemedicine could become financially sustainable.

Table A6.1. Comparison of variable costs

Type of service	Traditional care (Nepalese Rs)*	Telemedicine (Nepalese Rs)*
Radiology (plain X-ray)	15	15
Electrocardiogram	400	200
Pathology (cytology)	500	250
Dermatology	200	50
Transport (nearest city)	200	-
Lodging	200	-

*Rs 0.65 = US\$ 1.00.

1. *Nepal Millennium Development Goals (MDG): Progress report 2005.* New York, NY, United Nations Development Programme, 2005.

³⁷ http://www.idrc.ca/en/ev-137467-201-1-DO_TOPIC.html

ANNEX 7

Mobile-based health systems

Mobile devices are the first ICT tool that has penetrated even remote areas in developing countries. They are already widely used in various fields such as money transfer, market and agricultural information and weather forecasts. Innovations are being tested in the fields of education and health.

“mHealth” stands for the provision of health-related services via mobile communications. A mobile telephone is an appropriate technology for enhancing health and health services even in countries with low socioeconomic status and poor infrastructure. There are different visions and definitions of mHealth depending on social and economic circumstances. Some of the current barriers for the wider

adoption of mHealth in health systems in developing countries are:

- scarce evidence of health benefits;
- insufficient knowledge of appropriate integration into the health systems;
- lack of awareness on the potential and limitations of mHealth.

mHealth being widely recognized as a promising development, especially in providing improved health-care services to poor people and to those living in marginalized areas, information on its applications and experience with its use is increasing rapidly. Table A7.1 gives an overview of mHealth application around the world.

TABLE A7.1. mHealth projects in selected countries

Country	Project	Target population	Objectives	Description and results	Funding
Mexico	Vidanet CardioNet Diabediario	HIV/AIDS patients; diabetics	Inform about cardiovascular risks; follow and improve treatment adherence of diabetics	<ul style="list-style-type: none"> • Vidanet¹⁸ gives people living with HIV/AIDS the opportunity to register to receive SMS texts: to create awareness on the importance of receiving education messages to improve adherence. • CardioNet¹⁹ promotes self-health care, health risk prevention, and adherence to prescribed treatments. Individuals complete a questionnaire and their answers are evaluated according to WHO standards. Educational messages encourage them to exercise and to eat healthily. • Diabediario is a solution for changing diabetics' lifestyles, and controlling and improving adherence to their diabetic treatment. Any diabetic person who has a TelCel telephone can participate in the programme. 	Voxiva; Instituto Carso de la Salud
South Africa	Masiluleke	HIV/AIDS patients	Build awareness of HIV status, encourage HIV/AIDS testing and treatment; reduce the disease's spread	365 million text messages (one million per day) were sent to HIV/AIDS-infected people in 2008–2009. SMS message campaign promoting HIV/AIDS awareness resulted in nearly a tripling of call volume to a local HIV AIDS helpline.	Praekelt Foundation; iTeach; National Geographic; Nokia; Siemens Networks; MTN; Ghetto Ruff; Children of South African Legacies; Aricent; PopTech; Frog Design; National AIDS Helpline
Uganda	Text to change	Mobile telephone users	Build awareness of HIV status, encourage HIV/AIDS testing and treatment	SMS-based multiple choice quiz in exchange for free airtime (correct answers are provided). Participants are encouraged to present for HIV/AIDS testing. 40% increase in the number of patients who requested testing.	CelTel; AIDS Information Centre; Merck; Dutch Ministry of Foreign Affairs
India, Kenya, Malawi, Mozambique, Namibia, Uganda, United Republic of Tanzania	Freedom HIV/AIDS	Mobile telephone users	Inform and educate about HIV/AIDS through a game	Inaugurated in 2005 in India, Freedom HIV/AIDS comprises four mobile games targeting different mindsets and psychology of mobile users. In 15 months, 10.3 million game sessions were downloaded.	Hivos (Dutch development organization); KPN (Dutch telecom company); ZMQ Software Systems

¹⁸ <http://vidanet.voxiva.com/vidanet/Dashboard/Login.aspx?DashboardId=2&sm=&save=true&dash=true&Login=true&records=¤tPage=&Float=2&viewDash=&myDashboards=&Menu=23&breadC=true>

¹⁹ <http://www.voxiva.com/cardionet/index.html>

TABLE A7.1. mHealth projects in selected countries (continued)

Country	Project	Target population	Objectives	Description and results	Funding
Peru	Cell-Preven	Sex workers	Reduce sexually transmitted infections (STIs)	Use mobile telephones to send SMS messages with real-time data on symptoms experienced by clinical trial participants.	Voxiva; Universidad Peruana Cayetano Heredia (Peru); Imperial College (London); University of Washington (Seattle); Peru Ministry of Health
India, Andhra Pradesh	AESSIMS	Health professionals	Acute encephalitis syndrome information management system	Health professionals use any telephone or Internet-connected device to report suspected and laboratory-confirmed cases of acute encephalitis.	PATH; Voxiva; Government of Andhra Pradesh
Brazil		Field health agents	Containing the spread of the dengue virus	Customized questionnaires distributed to field health agents by mobile telephone. Health data and GPS location information are integrated to enable immediate analysis and identification of areas with high infection levels. Data collection times were dramatically reduced.	Nokia; Amazonas State Health Ministry
India	TeleDoc	Village health workers	Remote assistance for health-care delivery	TeleDoc provided handheld mobile telephone devices to village health workers.	Soros Foundation; Jiva Institut (approximate cost of the entire process is 70 rupees (US\$1.50) per consultation)
Peru	Nacer	Health professionals in remote locations	Improve maternal and child health	Telephone and web-based information and communication system. All reported data are recorded in a central database and made available to health officials in real-time for analysis and decision-making. The system can be accessed with any telephone (satellite, fixed-line, mobile, or community pay telephone).	USAID-funded Pathfinder International; Voxiva; Regional Health Directorate of Ucayali; Peru Ministry of Health

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