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# Is the doctor *on*?
# In Search for Users of Rural Medical Diagnostic Software in Central Himalayas

## Abstract

Development feeds on chronic crisis. Unfortunately, the Indian healthcare sector provides ripe ground for development as access to *quality* and *timely* medical diagnosis and treatment remains unrequited amongst its vast rural populace. Undoubtedly, computer usage has gained momentum with hope that it can address such issues. In recent years, with the acute shortage of doctors in rural areas, medical diagnostic software has been created as a surrogate for qualified medical practitioners, propelling non-physician workers to step in and take the lead. And herein lies the crux of the issue. For diagnostic software to function effectively in rural areas, it is paramount to identify who the user is, not just for effective medical treatment but for sustainability and scalability using software within the healthcare system. This paper focuses on one critical aspect in the piloting of a novel rural medical diagnostic software in Almora, Central Himalayas; specifically, the complexities involved in identifying "users" of such software as political, cultural and economic implications come to play. This takes on central importance and creates unresolved friction amongst a range of stakeholders. In highlighting this process, this paper serves to aid in the policy and practice of supporting diagnostic medical software in rural sectors across emerging markets.

**Keywords:** medical diagnostic software, rural India, user-interfacing, healthcare

## Introduction

Development is about addressing paradox. Healthcare in India is celebrated and critiqued at the same time. While India enjoys having one of the world's largest government healthcare systems, she simultaneously has private healthcare providers servicing 75% of her population (NRHM, 2005). Advertising low-cost to free public healthcare goes hand in hand with a burgeoning and highly profitable private medical insurance sector (Ellis, Allam & Gupta, 2000). While a new crop of medical tourists patronize India's state of the art hospital facilities and qualified doctors at a low cost, most of India's 6.5 lakh rural villages where two-thirds of the population resides, have few other options but to seek for diagnosis from healthcare providers with less than a high school diploma in hand (Roy, 2008). After all, 75% of allopathic

practitioners reside in cities, leaving space for a crop of unqualified practitioners to serve the rural public. For example, it was found that amongst rural general practitioners, only 29% knew the exact composition of oral dehydration solution (ORS) for diarrhea, an often fatal yet easily preventable malady amongst the poor, with none knowing the right method to prepare the ORS package (Patil, Somasundaram & Goyal, 2002, p.2)

Furthermore, the health issues that plague urban India is often not in parallel with that of its rural domain although people below the poverty line (particularly women and children), be it urban or rural suffer from common maladies of severe malnutrition and lack of access to basic treatment for curable diseases (Patil et al, 2002). For instance, nearly half of all Indian women in India are anemic. Yet, the extensity of such maladies in the rural area often far supersedes that in the urban.

Recognizing these issues above, the Government of India launched the National Rural Health Mission (NRHM) in 2005 to be taken through to 2012 with a prime focus on creating corrective and innovative measures in facilitating delivery of healthcare services, particularly in the rural areas. The goal of the Mission is to "improve the availability of and access to quality health care by people, especially for those residing in rural areas, the poor, women and children" (NRHM, 2005, p.1).

It doesn't take much to realize that these goals are familiar and resurface constantly with each new healthcare policy plan. However, the means to these goals change, often banking on new technologies to provide a solution to what is looked upon as intractable problems. With 512 million people in India not having access to a physician and even more of its population to a qualified practitioner, the goal of access to "quality" diagnosis and treatment becomes a formidable challenge. In fact, there seems to be a consensus in outlook on matters of technology

intervention within the healthcare industry, that being that while there are caveats to ICT in healthcare that policy makers, private agencies, NGOs and other stakeholders need to watch out for, new technology can perhaps circumvent these chronic issues:

> Advent of powerful medical electronics coupled with latest tools of IT and communication technologies are bringing opportunities for advanced healthcare services including – faster and more accurate clinical diagnosis, efficient emergency response, complex health analytics, wide area disease surveillance, remote patient assistance, rural health solutions, along with quality enhancement in services through online and integrated health insurance solutions, healthcare financing, extended care management and awareness (ehealth, 2007).

In fact, telemedicine is one such new technology that capitalizes on telecommunications for specialized consultations for diagnosis and treatment of diseases at a distance (Mishra, 2005). Another seemingly simple yet highly critical IT tool is the digitalizing of the hospital information system or Health Management Information System (HMIS) that is slowly but surely making inroads into government healthcare hospitals (of which the Indian government owns 66% of its market). This is aimed to replace the manual process of coping with the tremendous volume of medical data generated by India's vast populace. Of course with every new technology intervention, there is always a stakeholder that is pushing the envelope from the back to become the standard rubric for the government, else be the prime platform where multiple other services can be provided:

> In the larger hospitals, patient records remain difficult to access and these adversely affect quality of health delivery. The demands of the insurance sector for more efficient information storage and retrieval are also going to add to the pressure on hospitals and health providers. This may, in fact be the major driving force for modernization of this sector since the health insurance sector is poised for major growth in the coming decade. (Mishra, 2005, p. 1)

What is less in the limelight but nevertheless in the last few years has gained serious attention of several stakeholders including large global health philanthropy foundations, governments and private agencies is the integrated diagnostic and data management healthcare software package that promises to behave not just like a "secretary" but also as a "doctor." From complex data management to diagnosis, treatment and education of the latest medical advances in the field, these kinds of software aim to wrap up multiple services onto one single platform.

This paper is concerned with one such healthcare package called *RightChoice*[1] that has been clinically tried, tested and proven to have a 90-98% accuracy rate of diagnosis and treatment recommendations. This American-based medical software company has conducted comparative studies with other available diagnostic healthcare packages, revealing that it has not just the highest accuracy rate but is also the most tailored for developing countries with its offline software, comprehensive rural disease listing and capacity to provide data in multiple languages. However, to secure a government contract and funding from prominent global health foundations, what was seen as needed was a live pilot testing within a rural area in a developing country to demonstrate that within a real life scenario it can function just as effectively. This is

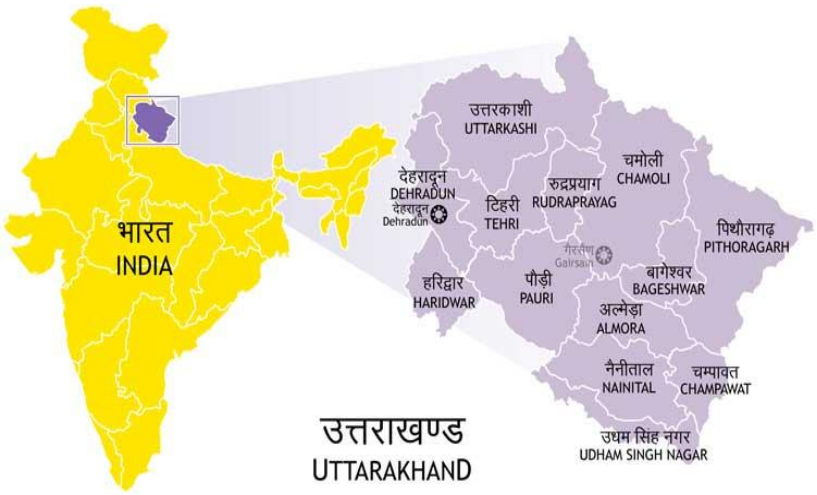
meant to create buy-in amongst the governments with hope of nationalizing the tool across States to enable national access to quality diagnosis and treatment.

In doing so, *RightChoice* Company established a six month partnership with Grassroots Project Developers, orchestrating this project at the ground level. Almora in Central Himalayas became the testing ground for this pilot study. This paper focuses on the paramount challenge in this software deployment - that of identifying and coming to a consensus on who the real "users" are of this software. This reached critical importance and revealed how interests of a range of stakeholders can create divergent and conflicting results, determining the success of such diagnostic packages in the developing world.

A description of Almora, its healthcare institutional setup, and the range of stakeholders is provided, followed by a summary of *RightChoice* and its promised capabilities. Building on this, an analysis is made of possible users and its implications on policy and practice. This paper serves to guide healthcare and development actors in addressing the range of obstacles faced when employing new technologies to improve healthcare in the rural sector, in this case, Himalayas, India.

## Almora: Settings for the Pilot Study

*In these hills, nature's hospitality eclipses all men can ever do. The enchanting beauties of the Himalayas, their bracing climate and the soothing green that envelopes you leaves nothing more to be desired…after having been nearly three weeks in Almora Hills, I am more than ever amazed why our people need go in Europe in search of health* - Mahatma M.K. Gandhi




While it is common to associate rural terrain with poverty, Almora, a picturesque district in the Kumaun region, east of the newly created Uttarakhand State in 2000 (previously called Uttaranchal) in India evokes all but that. This land lies between the river Kosi and Suyal and has stood as the cultural and political nodal point of Kumaun for almost four hundred years, settled by Chand Rajas and nurtured by the British. Yet, according to the latest 2007 Uttarakhand State Government statistics, 90% of Almora's 632,866 population resides in villages. Males number 294,984 and constitute roughly 47% of the population and females number 337,882 or 53% roughly. The reason for women outnumbering men is due to the high migration rate of 60% to the neighboring States of Uttar Pradesh and Punjab primarily due to its high rate of unemployment (Sati & Sati, 2000). This situation is exacerbated by an average literacy rate of 73% (higher than the national average of 59.5%) with 89% of the males and 60% of females literate. Further, a majority of the population are Hindus (98%) with the rest being a motley group of Muslims, Sikhs, Christian, and Buddhists.

Also, 90% of the population is engaged with subsistence agriculture with most of the population continuing to hold some land due to community and individual land rights unique to

this region predating the British occupation (Guha, 1995). This has, for better or worse, led to stringent forest laws in this region, leaving about 11% of the land available for irrigation (Mehta, 1996). Besides access to limited resources in the land of plenty, villagers in Almora struggle with certain basics for survival including access to quality healthcare, clean water, electricity, good education, and regular transportation, particularly as households are scattered across this mountainous region. For instance, 55% villagers have to walk more than 5 km to reach the nearest bank in Almora and women spend an average of 4- 6 hours collecting fodder and fuel for their day to day living (Mehta, 1996). Also, 60% of the rural population lives in areas that are more than 5 km from towns where access to most of the markets, hospitals, colleges and other services reside. 70% of people make the effort to visit the town at least once per month for a range of services including medical, pension, employment and education to name a few.

Given Uttarakhand is a newly created state, it has made efforts to gain the title of an "aspiring leader" in e-readiness as it actively engages in creating connectivity across its terrain through a steady supply of computers to high schools, universities, government agencies as well as providing ICT kiosks for access to a host of government services for villagers (OECD, 2006). Currently in Almora, all government high schools and universities have computers and broadband and wireless services have just come into fruition as of a few years ago. Additionally, initiatives for digitalizing data across government agencies are in motion including the health sector.

In fact, one of the first telemedicine facilities in this State has been established in Almora, namely the Base hospital which has high-end, cost intensive equipment to enable live conferencing and training of nurses and patient consultations with specialists not available in the district. That said, much like other telemedicine facilities across the country, it struggles with

technology breakdowns, poor management, dearth of computer friendly hospital staff and few partnerships with urban medical specialists willing to participate in such endeavors (Singh et al., 2006).

## Almora: Healthcare Status and Structure

Government rural healthcare in India across board is organized hierarchically as follows from bottom to top: midwives, Asha workers (community health workers) and Anganwadi (nursery school) workers (at the village level); above are Auxiliary Nurse Midwives (ANMs) situated at ANM sub centers, Primary Health Centers (PHCs) and Community Health Centers (CHCs); with the District Hospitals (DH) at the uppermost tier. Almora is no different. Asha workers constitute the bulk of the healthcare staff in the country. They are women "volunteers" appointed by the local Panchayat (village chiefs) and are responsible for health education and community mobilization in areas of immunization, common ailments, sanitation, Maternity Child Healthcare (MCH), and basic patient records (see Table 1). They are purely commission based, dependant on the services they provide. ANMs on the other hand, are full time government staff, supervising around 8-10 villages' healthcare workers, holding similar responsibilities to that of the Asha workers. It is important to note that both the Asha workers and ANMs services focus on preventive measures through education and awareness. They are not legally entitled to diagnose and treat patients. However, at the PHC and CHC level, there is an average of 2 doctors with a supporting staff of 2 ANMs per center. Here, the staff functions more at a curative level and depending on their facilities, conducts deliveries, surgeries, lab tests, ultra sounds, x-rays and the other medical examinations (see Table 1). In reality, updated

medical facilities, medications, treatments and qualified doctors are available only at the DH level which is located in Almora town.

In terms of utilization of these different services in Almora, the number of patients seen at a DH per month is about 10,000 versus 9000 at a CHC and 6150 at a PHC. Patients admitted at DH are approximately 300 per month versus 180 at the CHC and 41 at the PHC level. In other words, while the bulk of the staff resides at the primary healthcare level, most patients are found at the District level. Besides these government services, there is a thriving private practice in Almora as well as alternative medical outlets often used by the poorest. For instance, there are 51 Ayurvedic practices reported by the District Ayurvedic Officiator (DAO) in the villages versus 66 allopathic as reported by the Chief Medical Officer (CMO). However, as indicated earlier in the introduction, private healthcare is consumed extensively even amongst the poorest, often plunging them into heavy debt. Further, there are other actors that provide a spectrum of medical services to the poor, the two most dominant being local pharmacists and "jhad fook" or local shamans (Banerjee, Deaton & Duflo, 2004). In fact more villagers visit these two actors over the other health provider options including Ashas and ANMs unless in an emergency situation. This is even more so in the Himalayas given its mountainous terrain, serving as a natural challenge to accessing services mainly available in the town.

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Furthermore, there are a number of healthcare programmes running parallel in Almora that are not connected for the most part:

- National leprosy eradicator programme (NLEP)

- National programme for control of blindness (NPCB)
- National Vector Borne Disease Control Programme (NUBDCP)
- National Iodine Deficiency Disorder Control Programme (NIDDCP)
- National Tuberculosis Control Programme (RNTCP)
- Integrated Disease Surveillance programme (IDSP)

## *RightChoice* Diagnostic Software: Features and Capabilities[2]

*RightChoice* is a software suite that is designed especially for developing countries healthcare needs. It is pioneered and owned by an American based private medical software company backed by venture capital funding. Accurate and rapid diagnosis, portable and accessible medical information and informed public healthcare planning and implementation are their key selling points. It claims to be built around the most powerful and "intuitive" diagnostic software. It features a shift in medical informatics from simple data gathering to comprehensive systems management, data interpretation and decision support. It claims that even a minimally trained healthcare worker in a remote clinic can make an "accurate" diagnosis of common and challenging medical conditions and be guided to give effective treatment and advice. This is accomplished by its offline software-mediated intuitively guided interview process, supported by a medical database customized for the region of use.

With each patient encounter for diagnosis and treatment, a fully integrated electronic health record is created and the entire database is able to be compiled centrally for the purpose of healthcare planning for monitory and program evaluation. Its following capabilities are as follows: diagnostics, treatment recommendations (only for those diseases which have been

"approved" by the medical community as treatable by non-physicians and stabilization techniques by non-physicians), prevention and education, electronic health records, epidemiological and disease monitoring services (monitoring national health programmes and schemes through alert systems), supervision of healthcare workers (electronic flagging for mistreatment) and reference and treatment guide.

Given that the prime and unique attribute of this software lies in its diagnostics capability, here is a featured list of what it entails:

**Diagnostics**: (stated as "easy to use and tailored for language, culture and geography")

- Chief complaint system of diagnosing for those who do not know what questions must be asked to achieve proper diagnosis
- Must be accurate when symptoms or findings not consistent with the disease is entered from often unskilled interviewers
- Must offer suggestions that help a non-physician determine if a symptom is relevant or not by mimicking clinical reasoning
- Confidence level of diagnostic accuracy set as a threshold by physicians, allowing a non physician to treat a disease
- Ability to diagnose at least 90% of potential diseases seen so that confidence level takes into account more than just the diseases that a non-physician can treat

The next section focuses on the search for the most appropriate 'user' of this software through the pilot project in Almora, Uttarakhand.

## Realities and Remedies

Here is a reality: The rural government healthcare system in Almora, much like the rest of India, functions like a pyramid of services with the greatest weight of human resources resting at the village level where the bulk of healthcare workers reside: Ashas, trained mid-wives, and Anganwadi workers. However, in terms of the government's financial investment and usage of different healthcare centers and services by the vast rural populace, the pyramid is completely reversed. Much of the pressure falls at the curative, emergency level with heavy investment into lab equipment and specialists.

A chief reason for the extraordinary burden on the district hospital system is due to patient health seeking behavior that is primarily at the stage of emergency. This, for the most part, is attributed to factors of poverty - negligible disposable income for ongoing diagnosis and treatment, poor education, lack of access to qualified healthcare professionals at the PHC and CHC level and village distance from towns (Murti, Guio, & Dreze, 1995). Also, women, particularly in the Himalayas, straddled with their children and the tremendous day-to-day workload for survival have little time and opportunity to leave their responsibilities to take care of themselves. For instance, women in villages choose childbirth mostly at home, often in unsanitary conditions and get back to work almost immediately after, taking a toll on their health (Murti, Guio, & Dreze, 1995). Adding to this, there is often a perceived stigma attached to several common reproductive and gender healthcare issues, discouraging them from acknowledging and reaching out for help.

Other common behaviors amongst villagers that adversely affects their health (and often their children's health) include chewing tobacco and smoking (with many women doing this

during pregnancy), low use of sanitary pads amongst women, low frequency of bathing and washing hands prior to eating and nutritionally imbalanced diet (Grown, Gupta, & Pande, 2005). Villagers, time and again, first consult the local "jhad fook" or shaman and visit the pharmacist on health problems instead of using the local Asha and ANM workers. While this can be seen as driven by cultural matters, it is also a manifestation of their low expectations and loss of faith in government healthcare workers (Datla, 2004; Goel, Bali & Singh, 2007). In fact, few villagers knew the names of their local Asha and ANM workers in the areas surveyed for this pilot study.

This disconnect is perhaps due to some of the following reasons: both Asha and ANM workers are limited in their power and skills to diagnose and treat patients; their lack of access to most medication, high absenteeism amongst ANMs at their sub centers, and distrust of the purely commission based Asha workers who are incentivized to push agendas based on the commissions received. For example, Asha workers have become notorious for pushing pregnant women even at a late stage of labor into the ambulance to deliver at the hospital. Their incentive for such action lies in the 600 rupees commission that they get with each hospital delivery. Of course, rather than demonizing Asha workers, we should look at this as acts of desperation to earn their livelihood and survive.

Another reality to be kept in mind is the usage of pharmaceuticals and medical equipment in this complex narrative. These fields are highly lucrative and are deeply influential in the functioning of the healthcare sector. While the government's multi-crore (billions of dollars) budget is directed towards free medication for the poor, only a small percentage actually reaches these needy beneficiaries. Corruption is the most common reason for this as much of the medication, once having reached the district level, gets siphoned off into the black market, creating parallel underground agencies and economies (World Bank Report, 2008). Further,

recommending ultra-sounds, X-rays, and other lab tests indiscriminately is tied to high monetary incentives for doctors (Nunley, 2004). This practice has unfortunately created an expectation amongst the poor where they have for the most part, particularly due to lack of awareness, come to associate such tests and a high dosage of medication with "good" diagnosis and treatment.

## Hunt for the right "user"

For medical diagnostic software to be deployed in a rural area, what is most needed for it to succeed? This paper focuses on the search for the most appropriate "user" of this software. The reason for such a preoccupation rests on the fact that for deeply political, economic and cultural reasons as we will see, the user is the most highly contentious issue in this process. In starting to investigate what we mean by the "user" here, we need to see why it is economically beneficial to identify them in the first place. In most user-interfacing parlance, the "user" of a product, in particular that of technology is a person who interacts with that technology. But more importantly, they are also considered the current or future "consumers" of that technology (Cohen, 2005). While people can no doubt engage indirectly at a discourse level with technology (Arora, 2008), the focus of attention is on those who have the financial ability and interest to consume technology, albeit directly so. After all, they are seen to constitute the consumer base for current to future products and thereby provide a natural economic incentive for the private technology sector to focus on them. On this basis, products get designed and re-designed to satisfy this consumer base.

That said, what happens when a software product is designed for a population that may not necessarily be direct consumers in an economic and practical sense but indirectly so, through

a government agency? In other words, with massive State investment in new technologies for rural development, particularly the healthcare sector, in this case India where the rural base constitutes around 70% of its population, there is high incentive for private companies to make the rural population their prime users. Fascinatingly, a recent convergence has taken place between private technology agencies engaged in rural markets and the development sector as they both view their new beneficiaries in more proactive terms of "consumers" (Prahalad, 2004). The "consumer" can be argued to be both the villager as well as the State. In this case, the diagnostic software company is required to pay heed to the demands of the State and their perceptions of the needs of the rural base as well as that of the rural base itself.

Also, there is another "consumer" in the horizon. Any new technology, especially a complex diagnostic software package, however "intuitively" built, requires some basic training, education and familiarity and access to computers. And given that most of the rural populace do not have the privilege of access to and knowledge of computers as well as other factors of low literacy, lack of time and confidence in self-diagnosis, there is a need for an intermediary to step in to facilitate this process. Thereby, the user here is the intermediary between the rural villager and the diagnostic software. And considering we are dealing with the government healthcare sector, this intermediary is an actor from within the government healthcare system.

So what we have are three contenders for being the "user" here –State government officials (user with the purchasing power), the rural populace (end user) and the actual State healthcare workers (user as intermediary) who will directly interface with the software to provide diagnosis and treatment to the poor. From a political angle, the rural base has little say on the actual momentum of technology for development as these plans for digitalizing the village arena is not reflective of a demand from the village level but rather a collation of national,

transnational and international policy decision-making on bridging the digital divide and escalating mobility through key technologies (Sachs, 2005; Garai & Shadrach, 2006). For the financial viability for private companies to enter into this domain of designing diagnostic software for the rural domain, their prime customer is the State. However, if they are to succeed long term and scale accordingly, it is essential to get the rural base to use their software regardless of endorsements from the State. That is the real bottom line.

However, while the State can be the prime customer, she is often tied to a host of "interests" from a range of big players in the ICT and health field including international and transnational foundations such as the World Bank, Gates Foundation, UN and the like. This makes her eligible for external funding as part of a larger global effort of digital equity and eradication of poverty. Private diagnostic companies not only need to sell their ideas and software by appealing to the interests of the State but also have to keep in mind the range of actors mentioned above in this game of complex politicking. Several diagnostic companies have gone the private route, but given the competition in the private arena as well as the fact that a substantive profit can be made in dealing with the government, some diagnostic software companies seek the public healthcare sector route. Also, there maybe a (mis)perception amongst these companies that by dealing with the government sector, there can be a quicker and easier exit strategy post-sale of the software.

In the case in Almora with *RightChoice*, some general consensus was experienced amongst key NGOs, local private and government hospitals, transnational agencies and officials of the Uttarakhand State on the healthcare needs of the rural populace and their receptivity in the use of HMIS software in the health sector. There was however a serious need to convince them (and convince ourselves since this software had never been piloted before and only lab rested for

accuracy) on the real efficacy of this diagnostic software to function without a doctor present. This required a pilot study in Almora and in government terms, a Memorandum of Understanding (MoU) needed to be drawn between the government and us, which is basically a permission from the State allowing for this pilot study. A MoU is of course more than that as it signals to others that the government is behind the software and if it goes well, will consider deployment. In fact, it's a critical foot in the door without which no such initiative like this can be launched on any serious scale within the government healthcare sector. However, to design a pilot, we needed to make a case as to who the user would be in the place of a doctor. This paper will not go down the MoU path nor the misperceptions in exit strategies in dealing with the government even though it is well worthy of a separate investigation. Instead we continue to focus on user choice as this is what we perceive to be the first and critical step in this process.

To make this pilot a success story, our prime task was to first address who would be the intermediary for this software. To decide on this user, we had to ask 2 key questions:

- What are the minimum requirements needed for usage of this software by this intermediary?

- Where would this intermediary be stationed within the government healthcare system? (Village level, ANM sub center, PHC, CHC, District)

While these two questions come across as seemingly simple, they pose deep problematics when actually addressing them.

**Minimum Requirements yet Maximum Effectiveness Needed**

*RightChoice* does make the claim that a non-physician healthcare worker that is "minimally trained" can use this "intuitive" software. What counts as "minimal training" by them is 12th grade education or equivalent, bilingual in both English and Hindi and be respected in the community. The bilingual need is due to the fact that even when medical data is translated, there is still a tremendous amount of English clinical terms that seep in when sieving through medical data. This makes Asha workers and ANMs both equally qualified for this position of user.

However, there is a distinct bias. Private diagnostic software companies, in this case the foreign based *RightChoice* is incentivized to focus on Asha workers for the following reasons:

- a good amount of funding is being diverted in the direction of Asha village healthcare workers and is becoming a trend across emerging markets
- emphasizes the usefulness of the software by adding tremendous "value" to a low skilled healthcare worker thereby enabling the sale of the software
- greatest amount of outreach in villages through these workers that will facilitate scaling of this software

Interestingly, these interests of the private sector do go hand in hand with the government sector in India. After all, the national government with their relatively new NRHM policy marks their policy as different from prior healthcare policy of the last few decades by the introduction of the Asha scheme. This was to address the lack of access to healthcare education and awareness in villagers in India in general. Hence, Asha workers have been trained to change the

culture or “mindset” of the villagers on issues of basic sanitation and maternity and child care. However, this scheme at least in Almora seems to be failing as has been noted earlier, few villagers know their Asha workers and amongst those that do, many distrust or have unfavorable opinions of them. Hence, there is a need to rescue this pet scheme through reinvention and revitalization.

So from this bias stems a romance of ideas: of Asha workers using cellphones or other data collecting technical devices at the field level to capture symptoms of the patient and communicate that to the hospital where the diagnostic software is placed. This would give the diagnosis and treatment accordingly. Or perhaps they collect it manually and take it to the ANMs who then run the diagnostic program on this data and deliver the diagnosis and treatment.

Say for a minute that this system does work. It still cannot be done as per the healthcare policy in place where Asha workers and ANMs *cannot* diagnose and treat except for the stated tasks in the policy handbook as shared earlier. Hence, for a private company to come in to pitch this idea, however innovative, it still requires first a policy change at a national level before being implemented.

Say we play along for another minute and allow policy change to take place. Other significant barriers still stand:

- Asha and ANMs low credibility in the community
- Given their training, Asha workers do not have the capacity to produce follow-up questions on symptoms or make decisions even when guided by the software on which prompts to follow through with to fully investigate health issues for diagnosis and treatment

- Patients are generally not comfortable with the idea that a computer and an untrained staff can diagnose and treat them
- Even with a claimed 92-98% accuracy rate, what are the legal implications when the software does go wrong? Most governments would be very conservative about this allowance and even if they do, the legal system would probably step in even if the State complies.
- Diagnosis is not a data collection and treatment procedure but rather there is much follow-up needed with tests conducted in between to confirm diagnosis. Hence it's a multi-step process and not a simple symptom-diagnosis-treatment solution as often advertised
- Cell platforms however popular are still at a nascent stage to handle such complex operations and even when it does get technically sophisticated, private telecom companies need to be incentivized to participate in this process. Of course in this case the government telecom system can conduct this but it still requires a politically driven leadership for this.

Say even if these hurdles could be surmounted, this would still be addressing the diagnosis part and not the treatment. Diagnosis without access and affordability of medication is purely meaningless for villagers. Thereby, even if Ashas were to deliver the correct diagnosis, villagers often cannot afford the treatments prescribed and thereby will continue with their lives, annulling much of these efforts.

So what about ANMs then? They have a nursing degree and can be trained in the usage of this software. However, the legal and policy hurdles still apply in this case. But say this was to

be circumvented then the question of how to control the quality of their service still looms large. They are government employees after all and are part of the union so they cannot be fired. So how does a private sector engage with employees of a government sector unless the private sector exists soon after the sale of the software? In short, training has to lie in the hands of the government or perhaps an NGO, both of whom are subjected to variable quality.

So it comes down to the staff at the PHC, CHC and the district hospital. But here, doctors are present. So if we were to look at users here, it would immediately connote a significant change in mission by the private diagnostic software company, moving away from the grand claim of healthcare diagnosis and treatment recommendations at the village level by non-doctors to the humbler aim of improving accuracy and quality of diagnosis and treatment by doctors and expanding their capacity in this sector.

While this last option sounds the least sexy, it is perhaps the most realistic and most doable given that many doctors outside the urban areas as we noted earlier are often not well qualified and can through their misdiagnosis create fatal results amongst their patients. Hence, this software can be used as follows:

- As an educational tool to update doctors on the latest medical advances and new, simpler, cheaper and better treatment for the poor
- As a second opinion for doctors on complex cases to provide further accuracy
- To serve more patients effectively by managing their medical data including their history and past treatments

However, this would require doctors to be incentivized to treat villagers well for it's own sake with no additional financial remuneration. So even though they can, they may not necessarily be highly driven to doing so.

**Conclusion**

With this diagnostic software becoming dependant on a doctor and with these revised claims of it being a second opinion and educational tool to enhance quality of healthcare, it would no longer evoke the kind of attention and profit these private medical research companies are seeking for and nor would it propel governments to see it as an urgent policy tool to gain political ground.

And of course, we need to keep in mind that often the way for better healthcare is making the villagers self-reliant by providing them more on preventive healthcare education and care which often is more grassroots and non-technologically driven. However, this takes a tremendous amount of time and effort and a heavy investment into human over technical resources with perhaps hard to measure changes over long periods of time. This often does not gain the needed financial attention by governments as it's hard to mark it as novel and different from prior healthcare strategies. Thereby we will find more lip service done for preventive care with most of the capital still diverted to curative.

Also, with any new technology for rural healthcare at the village level, while harnessing the human resources of the Asha workforce is a good idea, they need to be strategically incentivized and an accountability system needs to be designed to hold ANM accountable for 8/10 Ashas to increase the number of patients that get identified through an independent agency under the CMO. Also, the diagnostic software can be implemented at a PHC level if the ANMs

are trained to pre-screen patients and assist doctors in diagnosis and treatment, reducing the burden on the district hospitals. Of course, it is important that at the PHC, all facilities for testing should be provided so as to run through this entire diagnosis follow-up process. This can happen if the resources for the PHC and CHC are combined as is happening in some parts of Almora (Hawalbagh district for instance), thereby increasing the functionality of these centers. After all, the pyramid structure is an inefficient means of capitalizing on a vast pool of innovative ideas – technical, social, political and economic for real change to transpire.

**Word Count**: 6904

**References**


Arora, P. (2008). Instant messaging Shiva, flying taxis, *Bil Klinton* and more: Children's narratives from rural India. *International Journal of Cultural Studies*, 11(1), 69-86.

Banerjee, A., Deaton, A., & Duflo, E. (2004). Health care delivery in rural Rajasthan. *Economic and Political Weekly*, February 28, 2004, 39 (9), 944-949.

Cohen, K.R. (2005). *Who we talk about when we talk about users.* Proceedings in EPIC, 2005, American Anthropological Association.

Datla, Vishnu (2004) Dokur: A case study in health seeking behaviour. Unpublished Institute of Rural Health Studies, Hyderabad.

Ehealth India Conference Proceedings (Aug 2, 2007). Accessed on September 13, 2008, from web site: www.ehealthonline.org

Ellis, R. R., Alam, M., Gupta, I. (2000). Health insurance in India: Prognosis and prospectus. In *Economic and Political Weekly*.

Garai, A., & Shadrach, B. (2006). *Taking ICT to every Indian village.* New Delhi: One World South Asia

Goel, S., Bali, S., & Singh, A. (2007). Impact of a short term intervention on health care outreach to a marginal population in rural North India . *The Internet Journal of Health*, 5 (2).

Grown, C., Gupta, G., & Pande, R. (2005). Taking action to improve women's health through gender equality and women's empowerment. *The Lancet*, 365 (9458), 541-543.

Guha, R. (1995). *Ecology and equity: The use and abuse of nature in contemporary India*. Penguin Publications.

Singh, K., Kapoor, L., Basnet, R., Chand, R.D., Singh, S., Joshi, P., Semwal, M., Durgapal Negi, K.S., Shah, R., Mishra, S.K. (2006). *Design and implementation of telemedicine network in a sub Himalayan State of India. Published Proceedings from* e-Health Networking Conference, HealthCom 2006.

India's Medical Tourism Market to Grow to $2 Bn by 2012 (Aug. 7, 2007). In *MedIndia.com*, article accessed on September 13, 2008, from web site: http://www.medindia.net/news/Indias-Medical-Tourism-Market-to-Grow-to-2-Bn-by-2012-24680-1.htm

Mehta, G.S. (1996). *Uttarakhand: Prospects of development.* Indus Publishing Company: New Delhi.

Mishra, S.K. (2005). Current status of E-health in India. Conference Proceedings, Busan, Korea accessed on September 13, 2008 from web site: http://openmed.nic.in/1265/

Murti, M, Guio, A.C., & Dreze, J. (1995). Mortality, fertility, and gender bias in India: A district-level analysis. *Population and Development Review*, 21(4), 745-782.

Norman, D.A. (2002). *The design of everyday things*, MIT Press.

Nunley, M. (2004). Why psychiatrists in India prescribe so many drugs. *Culture, Medicine and Psychiatry*, 20 (2), 165-197.

OECD (2006). E-Readiness index of the states. Accessed on September 14, 2008, from web site: http://64.233.169.104/search?q=cache:7CKqfjzqc5MJ:www.mit.gov.in/download/eready2006/Chap4.PDF+uttarakhand+e-readiness&hl=en&ct=clnk&cd=2&gl=us

Patil, A.V., Somasundaram, K.V., & Goyal, R.C. (2002). Current health scenario in rural India. In *Australian Journal of Rural Health*, 10, 129-135.

Prahalad, C. K. (2004). *Fortune at the bottom of the pyramid: Eradicating poverty through profits.* Wharton Publishing.

Roy, R. R. (June 13, 2008). *Shortage of doctors hits India's health mission*. Article accessed on September 13, 2008 from Web site: http://www.igovernment.in/site/shortage-of-doctors-hits-india%e2%80%99s-health-mission/

Sachs, J. (2005). *UN Millennium Project.* London; Sterling, Va: Earthscan.

Sati, M.C., and Sati, S.P. (2000). *Uttarakhand statehood: Dimensions of development.* Indus Publishing, New Delhi.

*Uttarakhand State Government Statistics,* (2007). National Rural Health Mission Document 2005-2012.

World Bank Report. (2008). Government of India and World Bank Group Join Forces to Stamp Out Corruption in Health Sector Projects. Accessed on September 17, 2008 from web site: http://www.worldbank.org.in/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/INDIAEXTN/0,,contentMDK:21609990~menuPK:295603~pagePK:2865066~piPK:2865079~theSitePK:295584,00.html

**Table 1: Potential Users for Diagnostic Software**

| Healthcare Worker | Qualification | Responsibilities (NRHM, 2005-2012) |
|---|---|---|
| Asha workers (government "volunteers" on commission basis) | VIII standard | • provides primary medical care for common ailments<br>• sanitation<br>• education and awareness of health issues and timely access to health facilities at village level<br>• holder for ORS, IFA, chloroquine, DDK, Oral Pills & Condoms, etc<br>• counsel women on Maternity Child Healthcare (MCH)<br>• prenatal information to postnatal follow-up<br>• record information on births and deaths |
| Anganwadi workers (nursery school teachers-full time) | high school degree | • Regular health and nutrition checkup of children at nursery level<br>• Immunization<br>• Health education |
| ANMs (full time govt staff) | Nurse | • Supervises Asha workers (overlap of tasks with Asha workers)<br>• Record keeping through 17 registers per week on healthcare information on their respective villages for the Chief Medical Officer's (CMO) Center |
| Doctors (PHCs) | MBBS | • 24 X 7 availability<br>• Deliveries<br>• Vasectomy<br>• Laparoscopic sterilizations<br>• NSV (No scalpel vasectomy)<br>• Mini lap (all in CHC) |
| Doctors (CHCs) | MBBS | • Deliveries<br>• C-section<br>• Vasectomy<br>• NSV<br>• Laparoscopic sterilizations<br>• Mini-lap seterilizations /post partum |
| Doctors (District) | MBBS | Specialized consultations and surgeries |

[1] Pseudonym created to protect the actors involved.
[2] This entire section has been taken directly word for word from the software sales brochure and does not reflect the authors views of the product