

TELEMEDICINE IN NEPAL

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Background:

Telemedicine is officially defined as the use of medical information exchanged from one site to another via electronic communications to improve a patient's clinical health status. With an ever-increasing access to information technology, it has never been easier than today to provide remote health monitoring services using simple computers with just an internet connection to anybody around the world.

The concept of telemedicine is not new anymore. In USA, telemedicine is used nowadays to get specialist service, second opinion or even to see a primary care doctor for people living in remote parts of the country like Alaska and Hawaii.¹ Telemedicine project has already been hitting grounds in India, South America and Africa² and has been extremely successful. One notable example is the "Swasthya Slate" launched by the Public Health Foundation of India, and health care workers carry these tablets to remote villages and perform 33 different tests and connect with the doctors in the city through internet.³

Nepal is a country where 24% of the total population makes less than a dollar a day. The doctor to patient ratio in Nepal is 1:10,000- one of the lowest in the world. Many Nepalese spend their entire lives without ever getting access to decent medical care due to many reasons such as lack of access to medical facilities or their inability to pay for one. Still in the villages, the number one killers have been malnutrition in children, pregnancy related complications in women and respiratory problems/COPD in elderly, and all of these problems can be soundly addressed by health education, nutrition education and early diagnosis through the use of Telemedicine.^{4,5}

To make the situation worse, Nepal was hit by a devastating earthquake on 25 April 2015 at 11:56 a.m. (Nepal time). Over 8,000 people lost their lives and more than 21,000 were injured. We believe Telemedicine will be useful to provide basic health care to the earthquake affected areas, provide expert consultation, make a referral network and provide an effective follow up strategy. It can also be used to

HOW IT STARTED ?

The **HTP Telehealth Innovation Foundation (now merged to ASK Foundation)** was started in 2066 BS with the intent of utilizing advanced audiovisual communication techniques in general healthcare. The concept started with four young doctors, fresh out of medical school, a young engineer and his patron figure, an old philanthropist who was an electrical engineer himself. This team was approached by an organization that was working towards improving Livelihood, Education and Healthcare in one of the remotest parts of the nation (Rural Welfare Council, Sipkhana VDC, Kalikot District), a village one would have to walk a day from the nearest motorable road to reach. With no existing healthcare facility in the village, and the best thing next to it being a pharmacy run by a businessman, the imminent need for a healthcare provider in the village could not be overemphasized at this point. As chance would have it, an auxiliary health worker (AHW), happened to live in the region and was interested in volunteering with what measures he had in hand. Our thoughts at that time were to train him in information collection and patient examination so that he could do the best he was capable of.

We already had a team of doctors who were willing to work pro bono a few hours every week, so as soon as we pooled enough resources to set up a telemedicine clinic at the village, we had the health worker come to Kathmandu for a training session, and he went back home, he took the equipment with him and set it up. So far we have already provided basic health care to more than 4000 people at Kalikot, in a span of 5 years. And the project has been self sustainable, and extremely successful.

We also set up clinic in Dhading which was running for 2 years until the earthquake in April 2015 destroyed the teleclinic center completely. Currently, we are just handling telephone consultation calls there.

Now, we want to focus our service to the people living in the earthquake hit areas.

Problem Statement – an experience from Kalikot :

It is not just access to healthcare facilities that determines the health status of a community; it is also the awareness level of these individuals and the community as a whole that predisposes these people to many preventable health conditions. The village of Sipkhana in Kalikot still has traditional beliefs and cultural practices that have long been abolished in the educated part of the world. The people do not have access to iodine containing food there, for instance, as they don't eat vegetables that often, even though they produce quite enough of green vegetables and they still use rock salt instead of the subsidized iodine fortified salt that the government provides (for lack of taste, as they put it themselves). This leads to hypothyroidism and goiter. Another important health issue among females is Uterine Prolapse, with was about one in every three women with multiple child birth and prolonged standing as risk factors. An awareness of sexual health and improved communication with healthcare personnel can certainly help prevent such issues.

In essence, most of the healthcare issues that we saw present in Kalikot could be resolved by improved communication and good counseling. Some of the medical supplies needed in the process were already there, the people just did not know what to do with it, and the absolute need for a proper counseling system, yet again, cannot possibly be overstated in this context.

The figure below shows a map of Nepal with the district of Kalikot highlighted in blue and a straight line connecting the district with the capital city of Kathmandu, showing a relative distance.



Video Conferencing and Medicine:

We have all seen video conferences in the past. They are pretty impressive, and have totally changed the concept of long distance communication in the past two decade

Early forms of telemedicine achieved with telephone and radio have been supplemented with videotelephony, advanced diagnostic methods supported by distributed client/server applications, and additionally with telemedical devices to support in-home care. [*Sachpazidis, Ilias (10 July 2008). Image and Medical Data Communication Protocols for Telemedicine and Teleradiology, Darmstadt, Germany: Department of Computer Science, Technical University of Darmstadt.*]⁷

When discussing the implications of a telemedicine service, one has to bear in mind, both, the possible limitations as well as the intended objectives of the initial project.

Advantages:

- The service is beneficial to patients living in isolated communities and remote regions, who can receive care and counseling from doctors or specialists far away without the patient having to travel to visit them.
- Recent developments in mobile collaboration technology can allow healthcare professionals in multiple locations to share information and discuss patient issues as if they were in the same place.
- Remote patient monitoring through mobile technology can reduce the need for outpatient visits and enable remote prescription verification and drug administration oversight, potentially significantly reducing the overall cost of medical care.
- Facilitation of medical education by allowing workers to observe experts in their fields and share best practices more easily.
- Data collected from such remote areas will help in policy making, implementing preventive measures, conducting surgical health camps, diagnosis of epidemics and pattern of disease, etc

Shortcomings:

- The cost of telecommunication and data management equipment and of technical training for medical or non-medical personnel who will employ it.
- There is also a concern that telemedicine may actually decrease time efficiency due to the difficulties of assessing and treating patients through virtual interactions.
- Additionally, potentially poor quality of transmitted records, such as images or patient progress reports, whether it be digital or otherwise, and decreased access to relevant clinical information are risks that can compromise the quality and continuity of patient care for the attending doctor.

Models of Telemedicine in Clinical Practice:

There are three main models of telemedicine in clinical practice:

Store-Forward Model: Patient data is acquired in addition to patient information and is forwarded to an expert for further management options. Both parties need not be online at the same time. A doctor can assess the findings offline and report on his convenience.

Remote Monitoring Model: Also known as self-monitoring or testing, enables medical professionals to monitor a patient remotely using various technological devices. This method is primarily used for managing chronic diseases or specific conditions, such as heart disease, diabetes mellitus, or asthma. These services can provide comparable health outcomes to traditional in-person patient encounters, supply greater satisfaction to patients, and may be more cost-effective too. This model requires patient education to be able to use these technological devices.

Interactive Telemedicine Model: This provides real-time interactions between patients and health care provider, to include phone conversations, online communications and home visits when necessary. Many activities such as history review, physical examination, psychiatric evaluations and ophthalmology assessments can be conducted comparably to those done in traditional face-to-face visits. In addition, "clinician-interactive" telemedicine services may be less costly than an in-person clinical visit.

The model that we use in our Telehealth project is the one discussed last, albeit with a bit of modification, in that, a health care provider at the village level is present in person with the patient at the time of interaction with the doctor to provide valuable clinical information from physical examination.

Methods:

The project requires both parties to be online at the same time, which meant a stable Internet Connection. In the village, we use cellular internet, while in Kathmandu, we rely on a broadband lease line from a reputed ISP.

For conferencing, we use an open source video-conferencing software like VSEE, or simply Microsoft's SKYPE. The computer itself is a low power consuming Intel Atom® based CPU that can be powered by a Solar Panel equivalent to about 80 watts, which was essentially donated by our organization.

In the local telehealth station, an AHW is present with the patient, while at the central offices, doctors visit on a rotational basis. Essentially, the physicians that are on call, talk to the patients at these stations and assess their complaints. Any relevant physical finding that has to be evaluated is reported by the AHW at the rural center.

The outcome is a carefully evaluated patient ailment with a qualified advice on management. It is obvious, however, that not all issues can be addressed directly and be managed at the primary level of health care, but, through a practical point of view, the patient is counseled concerning the ailment and he has a very good idea of what is wrong with him and is capable of choosing a good treatment option, out of those that are available to him.

We have been able to provide basic primary health care to the people at Kalikot. In the clinic at Dhading, we also used to provide specialist service once every month.

Our Telemedicine Central Offices in Kathmandu keeps a log of all clinical cases attended and the treatment options provided.

A summary of the cases seen so far have been presented in the adjoining section.

HOW TO MAKE IT SELF-SUSTAINABLE?

All the people involved are volunteers; we have almost zero administrative cost so far. We don't pay anybody, but we spend on setting up the clinic first. After that, the clinic has to run on its own, based on its self-sustainable module.

Here are **possible modules** we propose to make the clinics self sustainable

A> Take Sipkhana, Kalikot for example --

Patients pay a charge of Rs 50 for every encounter, and also pay for the medicine. The health care worker who runs the clinic keeps it by himself. But he is also responsible for keeping a supply of medications, paying for internet and maintenance. And whatever profit he makes, that will be his incentive. He is really motivated by the success, and he is willing to setup similar clinics in surrounding villages as well.

There is a small modification we can make on this module::

Instead of investing 100 % on the clinic, we invest on a mutual partnership with the health Care worker, say may be we only bear 50 - 70 % of the cost. And the added advantage will be a feeling of "ownership" to the health care worker and extra motivation to make his clinic successful.

Mr Hansha Raj (the health care worker at Sipkhana) is already proposing this adventure to open new clinics in his area.

B > Take Dhading for example ---

The community approached us, and we simply had to provide technical support and medical manpower to run the clinic. And, the community is solely responsible for investment and sustainability of the clinic.

This is the best module since we don't have to put down our own money, and also don't have to worry about self-sustainability. Also, the whole community will have a feeling of "ownership" and motivation.

So, I propose that we should approach local VDC or electoral representatives or local NGOs and just provide technical support, and give sole responsibility of the clinic to them.

Instead of we approaching them, it's better if they feel the need and approach us. So I think we need mass media coverage or a network of social leaders/activists.

C> Take LOOMA for example (it's our pipeline project)--

As per our mutual agreement with the LOOMA team (a not-for-profit project from Village Tech Solutions, who are working for last 25 years in Nepal)^{8,9}, they are providing Laptops with internet access to different schools of rural Nepal; and on the weekend, we are going to run Telemedicine clinics at the schools. So we will bear zero investment cost, and zero responsibility on our side for self- sustainability, and get a big network as well.

So we should approach similar NGOs/INGOs and offer our technical support to add our medical service to their pre-existing projects.

D> setup an urban Teleclinic with paid service

We can set up Teleclinic in urban setting, like small cities or headquarter of different remote districts collaborating with the local medical shops. The consultants located in KTM will provide teleconsultation to the patients via Telemedicine, and we will take fees for the service. We can use this money to support our rural projects. We have already identified a potential partner in Shyangjha, and are going to run a field survey soon.

E> provide Telemedicine service to Health Posts --

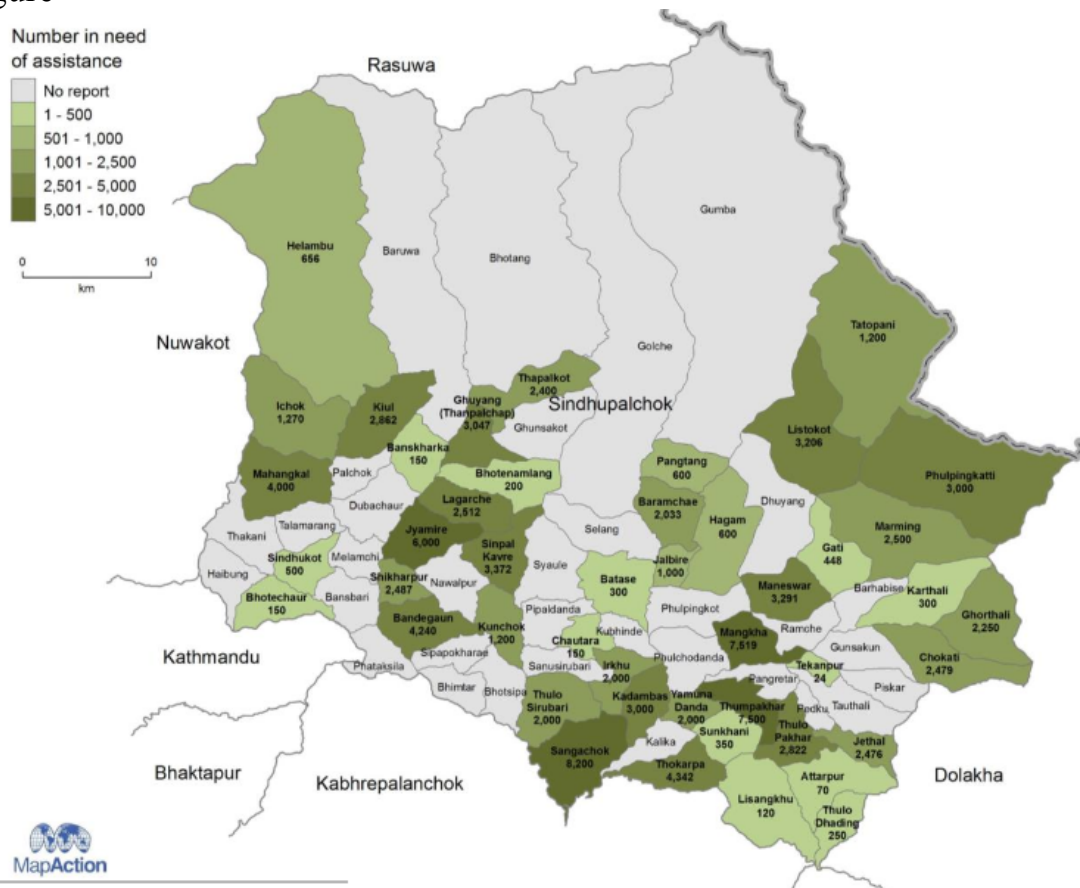
There are already a number of Health Posts in rural Nepal, but without a doctor. But they already have other health care workers.

So we will set up Telemedicine service in those health posts, so that the local health care worker can consult doctors or specialists whenever needed. The health-personnel working in the village will be paid by the government, but we might have to pay the doctors on our side. We hope, once we set up urban Teleclinics, the money generated will be enough to pay off the doctors.

PROPOSED TELEMEDICINE SERVICE IN EARTHQUAKE AFFECTED AREAS

UNOCHA (United Nations Office for the Co-ordination of Humanitarian Affairs) situation report assessed Sindhupalchok district and reported that 63 health facilities had been completely destroyed and 12 partially destroyed¹⁰. It had reported that 61 percent of health facilities had been destroyed. Lack of proper health care and care worker have affected proper health care delivery in these areas. The earthquake had affected the supplies, technical and infrastructure conditions as well. There was also lack of proper consultation to identify the disease and guided them for proper treatment.

worker.
figure



Proposal for Telemedicine project in Fulpingkot VDC of sindhupalchok

We have chosen Fulpingkot VDC of Sindhupalchok as our first VDC to start the project. Fulpingkot was badly affected by the earthquake and reported that around 95% of the houses were collapsed or uninhabitable.^{11,12}

The major barrier to providing health care in this earthquake hit area is the lack of accessibility, infrastructure and manpower. We can easily address this issue by setting up Telemedicine service in the Health Post of the affected VDC, and provide timely consultation by a doctor from the capital city. We can implement our tested and proven module in this scenario.

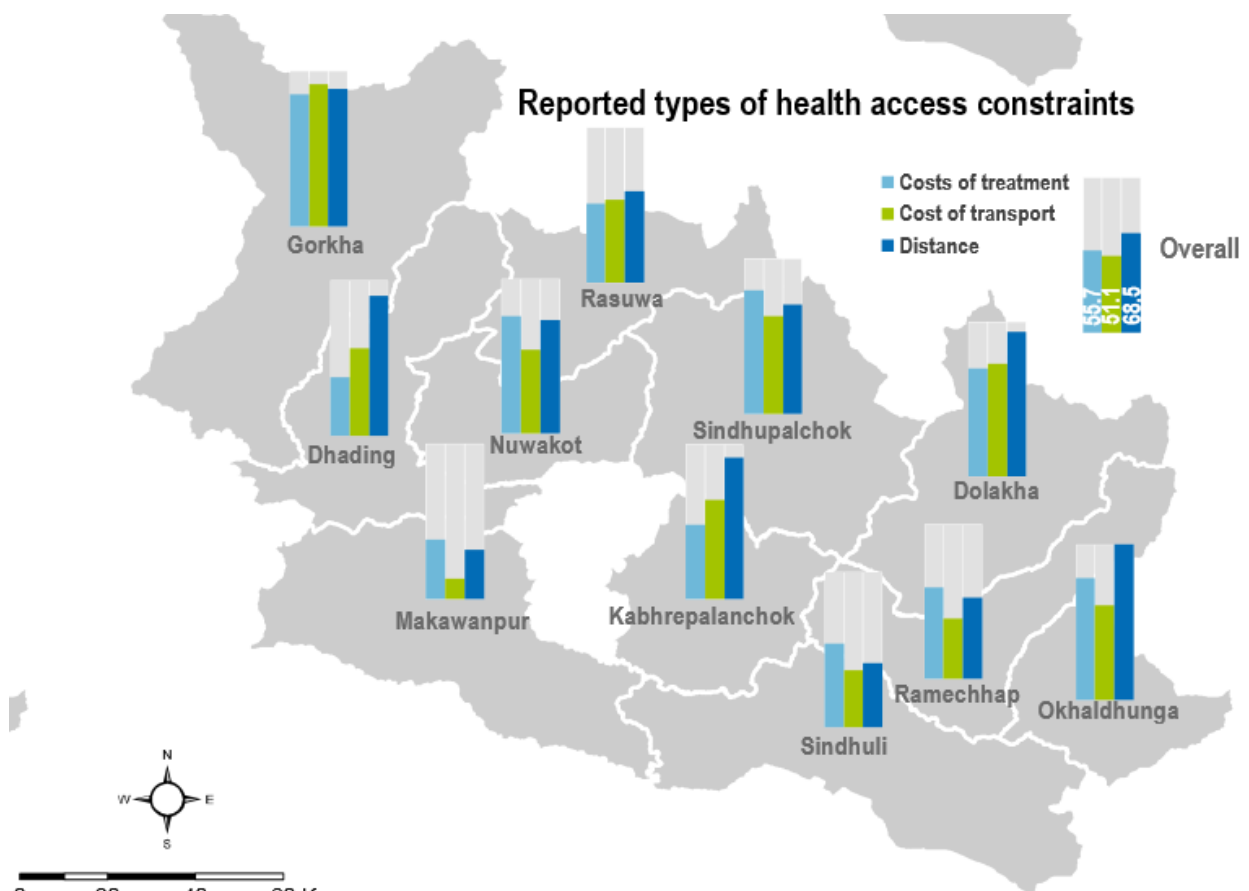


Figure 2 Access to facilities and services on recovery program [3]

ESTIMATED COST

We are planning to set up Telemedicine service in at least 3 Health Posts of the affected VDCs of Sindhupalchok, starting from Fulpingkot VDC first. Since we plan to expand it to other areas soon, we will have no option but to pay the doctors for their service as well. The health personnel in the VDC is a government staff, so we won't need to pay for his time. Also, we need to hire a full-time staff in Kathmandu to manage the project, and publish timely reports. We will have to bear the cost of internet and office expenses at our office in Kathmandu, but the internet expenses at the VDC should be managed by the government or they can charge NRs 50 to each patient, like our module at Kalikot.

Here is an estimate to set up each Teleclinic and run it for 1 month at the current market price ::

<i>Laptop on low power and video-conference capable</i>	NRs 40,000
<i>Solar panel of 100 W (there is no electricity)</i>	NRs 50,000
<i>CDMA Adapter</i>	NRs 15,000
<i>Training and transportation</i>	NRs 30,000
<i>First month operational cost for internet</i>	NRs 3,000
<i>Doctor's fee (NRS 1000 per session; 4 times a week)</i>	NRs 4,000
<i>TOTAL per clinic setup</i>	NRs 142000
<i>TOTAL for 3 clinics setup</i>	NRs 426000

So to set up 3 Teleclinics in those remote areas, we are looking at a total cost of **NRs 4,26,000** only.

Once we setup 3 Teleclinics, the monthly expenses for 3 Teleclinics will be as follows :

<i>Monthly doctor's fee (Rs 1000 per session; 4 times a week)</i>	NRs 4,000
<i>Maintenance and transportation</i>	NRs 20,000

MONTHLY TOTAL FOR 3 CLINICS ***NRs 24000***

So to keep 3 Teleclinics running in those remote areas, we are looking at a total cost of **NRs 24,000 per month.**

Within 1 year, we are planning to setup few Urban Teleclinics which will offset the running cost. So looking at **initial 1 year**, we are looking at a figure of **NRs 2,88,000.**

So in total, to set up 3 Teleclinics in VDCs of Sindhupalchok and keep them running for at least 1 year until we setup urban Teleclinics to offset the maintenance cost, we are looking at a figure of **NRs 7,14,000 only.**

At current exchange rate as of March 21st, 2015 which is 106.58 Nrs for 1 dollar, this amounts to **USD 6,699.19 only (to set up 3 Teleclinics and keep them running for 1 year).**

THE TEAM

We have a team of volunteer doctors, software engineers, MBAs with common interest working in Telemedicine in Nepal. We have founded a registered not-for-profit organization named as **ASK Foundation**. We have our own website in a different name, but soon will be changing our domain to ASK foundation. Here is the link to our website, where we update all our projects and financial summary as well, maintaining a complete transparency.

<http://www.nepalyouthinitiative.com>

Currently, we are providing basic health care to 2 different villages in remote parts of Nepal (Kalikot & Dhading).

The computer and the technical stuff is handled by our engineering team headed by Er Dibyesh Giri, an IT professional who runs his own private IT firm, and Mr Muni Shakya, the 1st computer scientist of Nepal. (He has been making cheap computers by himself and providing to us to set up Telemedicine clinic in villages. His computer can run in 15 watts of power -- his wiki page :: http://en.wikipedia.org/wiki/Muni_Sakya)

And, the medical team has been handled by Dr Swikrity Upadhyay, Dr Bishow Bandhu Bagale, Dr Binayak Upadhyay and Dr Nirmal Basaula.

Our team in USA is basically working on funding and networking. Once we set up an EMR and the volume of patients grows bigger, we will be able to provide direct patient care.

Detail of our team is updated in our website.

Conclusion / Summary

The concept of Telemedicine is definitely not new, but the idea of implementing this concept in rural areas that are virtually inaccessible to the doctors working in the city or abroad, is a big challenge. This way, doctors can actually see patients and offer their advices with minimum resources spent. There are constraints, limitations and problems in communication along the way, of course, but as with our project, the net outcome is an improved awareness in a targeted community, an improvement of the overall health status and identification of important health related issues that can be later addressed at a regional level.

Very soon, we want to set up EMR in our system once we reach around 10 clinics, and provide specialty service as well. We also want to reach out to the Nepali doctors working abroad and provide them an opportunity to make a difference in the lives of people living in rural and underserved parts of Nepal. The community response has been overwhelming, and we are extending the project to several other villages, mostly upon local requests, in other parts of Nepal. For now, we would like to extend our support to the earthquake affected areas.

We also want to venture in the field of education, agriculture & livestock, development of infrastructure, communication, etc in the remote parts of Nepal using the same Telemedicine clinics as hub stations.

MEDIA COVERAGE

Here are the **youtube videos** about our project

[https://www.youtube.com/watch?v=Ir55Htf
aHRM](https://www.youtube.com/watch?v=Ir55Htf
aHRM)

[http://www.youtube.com/watch?v=jpigaZA
80Cg](http://www.youtube.com/watch?v=jpigaZA
80Cg)

[http://www.youtube.com/watch?v=oN93B18
8erY](http://www.youtube.com/watch?v=oN93B18
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Here is our **website**

<http://www.nepalyouthinitiative.com/whatwedo/>

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Adnexae:

1. Photos:

Schools in Kalikot..





The infamous “chaupadi” trend where a woman having her monthly periods has to live separately in a shed with household animals:



Photos from Telemedicine Sessions:



A child with congenital hydrocele



Screenshot: Doctors in Kathmandu talking to a patient in Kalikot

'Online' clinic saving lives in Kalikot

TULARAM PANDEY
KALIKOT, JAN 12

RAMPURA Damai of Siphana VDC-1 in Kalikot district has every reason to smile, now that she is better after some gruelling years of health complications since the birth of her first child at home.

Following heavy bleeding recently, Damai was admitted to a telemedicine facility that has been set up in the village.

The woman, who had never seen a hospital during her previous deliveries and who was battling death, got a new lease of life after assistant health worker Hamsharaj Neupane treated her "online" with advice from doctors in Kathmandu through the Internet.

Dr Smriti Upadhyay, Dr Asim Bhattarai and Dr Nabin Khanal of the Teaching Hospital in the Capital helped Neupane in Damai's treatment via the Internet. "The doctors ultimately saved my wife," said Khaire, Damai's husband.

Sangita Simkhada, another local woman, gave birth to a baby in a sim-



Women wait for their turn at the telemedicine facility in Kalikot.

POST PHOTO

ilar fashion through the "online" treatment.

Damai and Simkhada are, however, not the only ones to have benefited from the telemedicine facility.

Lila Simkhada, the chairperson of Rural Welfare Council, an NGO that launched the service in the VDC, said the facility that provides free treatment has saved the lives of 19 women suffering from serious ailments so far.

Neupane said a total of 1,432 people (851 women and 581 men) have

availed of the services since the facility's launch last year. He said doctors also write prescriptions for the patients online.

Patients from neighbouring VDCs—21 from Bajura, nine from Achham and three from Mugu—have also benefited from the service, he said.

Advocate Pramod Neupane said the service has turned out to be a boon for the poor people in rural areas of the district who are still deprived of treatment and medicine.

News excerpt from the Kathmandu Post: Jan 12, 2012