eHEALTH IN RURAL AREAS

ACCESS TO MEDICAL CARE, TRAINING AND PREVENTION IN GUATEMALA
EXECUTIVE SUMMARY

The Department of Alta Verapaz in Guatemala has an indigenous population of about 90% and one of the highest maternal and infant mortality rates in the country. TulaSalud is a Guatemalan NGO which was established in 2008 with the support of the Canadian Tula Foundation. It works in Alta Verapaz with the aim of “strengthening healthcare (especially maternal and child healthcare) among indigenous communities in remote rural areas through Information and Communication Technologies (ICTs)”.

Tula Salud’s work is based around two core pillars: distance training for nursing assistants and technicians using an approach focused primarily on the healthcare of indigenous communities; and remote healthcare and support in rural areas using cell phones. In addition to these two lines of work, a third area focuses on health prevention and promotion (the Xbeil li Kawilal initiative, which means “path to health” in the Q’eqchi’ language). This initiative selects and reinforces the position of young indigenous female leaders in rural communities to provide training on issues related to self-esteem, 1

Abbreviations

<table>
<thead>
<tr>
<th>CC</th>
<th>Community Center or Primary Care Center</th>
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<tr>
<td>CIDA</td>
<td>Canadian International Development Agency</td>
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<td>DASAV</td>
<td>Health Department of Alta Verapaz (Dirección de Área de Salud de Alta Verapaz)</td>
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<tr>
<td>ENEC</td>
<td>Cobán National School of Nursing (Escuela de Enfermería de Cobán)</td>
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<tr>
<td>FC</td>
<td>Community Facilitator (Facilitador Comunitario)</td>
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<td>ICTs</td>
<td>Information and Communication Technologies</td>
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<td>MSPAS</td>
<td>Ministry of Public Health and Social Assistance (Ministerio de Salud Pública y Asistencia Social)</td>
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<tr>
<td>PEC</td>
<td>Expansion of Coverage Program (Programa de Extensión de Cobertura)</td>
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<td>PSS</td>
<td>Health Service Providers (Prestadoras de Servicios de Salud)</td>
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2 http://www.tulasalud.org
3 http://tula.org/
life-planning, sexual education and decision-making to groups of young teenagers (with remote support from a cultural facilitator).

TulaSalud’s policy of strategic partnerships has assured the institutionalization of the model which is currently overseen by an Advisory Board composed of the Department of Health of Alta Verapaz (DASAV in Spanish), Cobán National School of Nursing (ENEC in Spanish), Cobán Hospital, the Tula Foundation and TulaSalud.

Methodology

In order to produce this case study interviews, meetings and field visits were carried out in Alta Verapaz (24-30 June, 2013) and Guatemala City (1-2, July 2013).

Most of the information came from the NGO TulaSalud and included interviews with its department managers and the Executive Director. Visits and group meetings were also carried out with the managers of the Health Department of Alta Verapaz and Cobán National School of Nursing. A number of programs and centers were visited, including the Nursing Technicians Distance Training Program in the remote Municipality of Ixcan (Quiché Department), the Permanent Care Center in the District of Campur and one of their Primary Healthcare Centers in the community of Betania. In the latter, the community facilitators at the center, the professional nurse, who comes once a month, and the female leaders of the X’beil li Kawilal initiative were all interviewed. In Guatemala City interviews were conducted with the heads of the Expansion of Coverage Program (PEC) and the Mesoamerica Health 2015 Initiative, both from the Ministry of Public Health and Social Assistance. National policy regulations for the healthcare system in rural areas, and the strategic and operative annual plans of TulaSalud were also reviewed. The institutional coordinator of the Tula Foundation in Canada was also interviewed by videoconference.
1 CONTEXT

GENERAL CONTEXT

According to forecasts of the National Institute of Statistics (INE) from the last census in 2002, the current population of Guatemala (which covers 109,000 square kilometers) is 15.5 million inhabitants\(^4\). Of these, 40% are from indigenous communities, 15% are white and 45% are mixed race.

In 2011, 53.7% of the population lived below the poverty line\(^5\). The Human Development Index (HDI) for Guatemala was 0.581 in 2012. This low figure is mainly attributable to the educational component which ranks Guatemala as 133\(^{rd}\) among 161 countries reviewed by the

\(^4\) [http://www.ine.gob.gt/np/poblacion/index.htm](http://www.ine.gob.gt/np/poblacion/index.htm)

United Nations Development Program (UNDP) in 2013\(^6\). Guatemala has the lowest educational indicator in the whole of Latin America (not including Haiti). The levels of inequality in the country are also very high\(^7\). In the health sector, for example, the maternal mortality ratio (MMR) is three times higher among the indigenous population (211) than among the non-indigenous population (70)\(^8\).

**Alta Verapaz**, one of the 22 departments that make up the country, is where the TulaSalud project started and where most of its activities take place. Alta Verapaz\(^9\) has a population of 1,183,241 inhabitants, 78% of whom live in rural areas. In 2011, 89.6% of the population lived below the poverty line with 46.7% living in extreme poverty\(^10\). 89% of the population is indigenous, the large majority from the Q’eqchi’ ethnic group and a minority from the Poqomchi’ ethnic group. 48% of this indigenous population lives in extreme poverty and the illiteracy rate within the Department is around 32%.

Within the **health** sector the infant mortality rate in Alta Verapaz is 20.18 deaths per 1,000 live births, and the proportion of births attended by health workers does not exceed 39%. According to data provided by the Reproductive Health Observatory (OSAR in Spanish), in 2012, 73 maternal deaths were reported in Alta Verapaz from a total of 26,642 live births. This gives a maternal mortality rate of 274, comparable to, or even higher than, that of Cambodia or Eritrea. Furthermore, the chronic child malnutrition rate stands at almost 60%.

The cultural gap is an important factor in the provision of healthcare to the indigenous population. Mayan culture has particular beliefs about how to address health problems which frequently conflict with official healthcare services. When giving birth, for example, women usually adopt a vertical position with the help of community midwives and their families. In this sense, it is important to note the efforts of DASAV, TulaSalud and Cobán Hospital to set up a room for vertical child delivery and raise awareness about this among staff.

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\(^8\) [Observatorio de Salud Sexual y Reproductiva del Congreso de la República.](http://www.desarrollohumano.org.gt/fasciculos/cifras_v4.html)


INSTITUTIONAL AND REGULATORY FRAMEWORK

Article 4 of the Congress of the Republic Decree 90-97, entitled the “Health Code”, states that “The State, pursuant to its obligation of safeguarding the health of the population and maintaining the principles of equity, solidarity and subsidiarity, shall develop, through the Ministry of Public Health and Social Assistance […] health promotion, prevention, recuperation and rehabilitation measures […] in order to procure the most comprehensive physical, mental and social well-being of the Guatemalan people. Furthermore, the Ministry of Public Health and Social Assistance (MSPAS in Spanish) will ensure the provision of free services for those people and their families whose personal income limits their ability to fully or partially afford the health services provided”.

In line with the MSPAS Organic Internal Regulation (Governmental Agreement 115-99), the health service network is structured in three levels of healthcare:

- **Primary Level.** Primary healthcare is provided at two types of sites, the Community Center (CC in Spanish) - or primary care center - and the Health Post. The Community Center is the least complex of the service network. It is open four hours a day and attended by a Community Facilitator (FC in Spanish), a volunteer from the community, and receives a monthly visit from a basic health team (composed of a nursing technician and a community educator). It provides services for 1,500 inhabitants in the surrounding area. The Health Post serves as a link between institutional and community networks and covers a population of around 5,000 inhabitants. It is open for eight hours a day with care usually provided by nursing staff.

- **Secondary Level.** The secondary level of healthcare is subdivided into Health Centers that are open for eight hours a day, as well as Permanent Care Centers, and Comprehensive Maternal and Infant Healthcare Centers. These centers cater for about 20,000 people and their premises are usually located in municipal capitals. They are always staffed by a doctor, a dentist, and nursing and administrative personnel.

Tertiary Level. This level covers referrals from the primary and secondary levels, and also deals with emergencies. Its structure includes Departmental hospitals providing curative medical care with admission, staffed mainly by general practitioners able to cover healthcare, surgery, obstetrics, pediatrics and basic traumatology; regional hospitals with highly specialized doctors and an intensive care unit; and referral hospitals that provide services in specialist areas, conduct research and are supported by diagnostic and therapeutic procedures that demand high levels of technology and service specialization.

Alongside these arrangements, the Program for the Extension of Coverage (PEC in Spanish) was created in 1996 under the Political Constitution of the Republic of Guatemala, Health Code and Peace Agreements, with the objective of providing healthcare to the 46% of the population that remained outside the catchment areas of healthcare centers and posts. One of the peculiarities of this Program is that medical attention is not offered directly by the MSPAS but through Health Service Providers (PSS in Spanish), Guatemalan NGOs that are certified by the Ministry, assigned specific areas of jurisdiction and paid a fixed rate based on the population they cover. The PSS are in charge of recruiting and providing training for the FCs of the communities that attend the CC, as well as funding the basic health team that visits them once a month. This Program is currently introducing the idea of a reinforced primary center with a nursing assistant on duty for eight hours a day.

The activities of TulaSalud are mainly directed towards the primary healthcare level, reinforcing the work of the FCs and smoothing the interface between healthcare personnel at this level with those at secondary and tertiary levels.
THE MODEL AND HOW IT WORKS

BACKGROUND AND RATIONALE

In 2004, Cobán Nursing School (ENEC in Spanish), in collaboration with the Center for Nursing Studies of Newfoundland\(^\text{12}\), and with financial support from the Canadian International Development Agency (CIDA), started the implementation of a project to “promote nursing for primary healthcare”. Its main activity was centered on providing training for nursing assistants from rural areas using ICTs. The Canadian Tula Foundation took an interest in the initiative from the start and provided economic support by offering scholarships to students from indigenous communities.

In 2007, the Tula Foundation began funding a new line of “tele-health” work. This work sought to meet the demands for quality healthcare in rural areas, as well as provide cover for ongoing emergencies related to complications in pregnancy and childbirth.

In 2008, in order to ensure the successful continuity of activities after completion of the CIDA-funded project, the Guatemalan NGO TulaSalud was formed. Its head office was maintained for a further two years at ENEC. TulaSalud and the Tula Foundation have always maintained a relationship as strategic partners. Although most of the funding for their work comes from the Tula Foundation, key decisions are taken jointly and technical tasks are carried out through daily coordination. The Foundation states that this collaboration, based on mutual respect, coordination and recognition, reinforces

\(^{12}\) http://www.cns.nf.ca/
the importance of working with trained people that come from their own communities to solve their own healthcare challenges. In this respect, the use of ICTs has been both a tool for achieving a goal and a goal in itself.

› TELE-EDUCATION

The tele-education work of TulaSalud is wholly coordinated with ENEC. Three year training courses are offered for nursing technicians and one year courses for nursing assistants. The courses are carried out at the School’s premises in remote locations (healthcare centers located in municipal capitals) in order to train local staff. The nursing technician courses are offered through a multi-videoconference system with teachers lecturing at weekends from ENEC in Cobán.

The five remote centers that have been used to date have a tutor who supervises the training process in person. The tutor also guides the students through the practical lessons and activities undertaken during the week. So far 243 nursing technicians have been trained in this way and have received a qualification and training comparable to that offered by ENEC in Cobán.

Four more distance nursing assistant courses have been carried out in the same manner and 860 graduates are now working in the public healthcare system. Their teachers, 16 in total, work in a decentralized way from the remote sites, with students following lectures from different parts of the country through a videoconference system (to date there are 37 locations in nine different Departments). This model of “service learning” encourages students to put into practice in the evenings what they have learnt in the mornings, always under the supervision of a local healthcare staff member acting as a training tutor. The selection of these students is based on criteria such as background and excellence (they must have a good academic record, come from the rural areas and have the backing of their community), with the objective of ensuring their future career stability in the rural areas. Course vacancies are coordinated with the MSPAS in line with specific recruitment needs.

Another distance learning diploma has also been taught as a short-term specialist course focused
on maternal and infant health for nursing assistants. This course has produced 178 graduates in 12 different locations across the country. The launch of a new cohort is being planned alongside a diploma level course oriented towards “health and nutrition” for community educators.

This training methodology uses a combination of technology - through the platform Elluminate Live\textsuperscript{13} - and face-to-face support. Currently more students graduate from ENEC through distance learning than at their premises in Cobán.

\textbf{TELEMEDICINE: REMOTE HEALTHCARE SUPPORT}

The work of TulaSalud in this area is very much focused on the figure of the Community Facilitator (FC in Spanish), a volunteer accepted by the community who, with a small stipend from MSPAS\textsuperscript{14}, attends to the healthcare of their community and others nearby. The innovation introduced by TulaSalud here has been to provide the FC with a cell phone that allows them to make inquiries and provide full epidemiological information relating to the case attended, even adding a brief clinical history for each patient (using the platform Kawok\textsuperscript{15} which is based on CommCare\textsuperscript{16} software). The cell phone also enables FCs to receive ongoing training through audio-conferences and carry out health promotion and prevention activities with the population via remote briefings in the Q’eqchi’ or Poqomchi languages.

Today, 195 FCs equipped with a cell phone operate in 710 rural communities and cover an approximate population of 330,000 people. At the beginning of the project, in order to build trust, diagnostic inquiries or concerns about treatment were made to the doctors and nursing staff from TulaSalud. Now, however, the majority of questions are referred to members of staff at health centers or hospitals in the public healthcare system. In some cases these inquiries are accompanied by photographs taken by cell phone or data (blood pressure, temperature, etc.) collected with basic equipment provided by TulaSalud.

13 A product from Blackboard Inc.
14 At the time of writing, 600 Quetzales are equivalent to roughly US$ 75 a month.
15 http://www.kawok.net/
16 A product developed by Dimagi Inc.
One of the most important uses of the cell phone is for the coordination of urgent transfers. Prior to the initiation of the project it was impossible to ask a health center to send an ambulance to assist with an emergency case. Now, thanks to the work carried out by TulaSalud, the staff at MSPAS responds to the request for such a service from the FC. It should be noted that most communities in Alta Verapaz are inaccessible by car, so the phone is fundamental for coordination between the ambulance driver and the people who carry patients to meet the vehicle on foot.

In the five years between 2008 and 2012, TulaSalud’s FCs have dealt with 116,275 medical consultations, carried out 6,783 pregnancy check-ups, coordinated 2,014 emergency transfers, 298 of which were high risk pregnancies (classified by DASAV as “saved lives”), and 235 children under five.

In addition to the abovementioned services, TulaSalud has also installed a telemedicine module in Cobán Hospital which provides a 24-hour service from personnel that speak indigenous languages. This service is responsible for receiving and coordinating transfers from rural areas as well as assisting indigenous patients during their stay in hospital (with personalized monitoring tasks, translation services, telephone communication with relatives in rural areas, etc.).

THE X’BEIL LI KAwilAL INITIATIVE

While the telemedicine program works to improve maternal and infant health indicators in the short-term, and the tele-education program focuses on the medium-term, the X’beil li Kawilal initiative is aimed at generating long-term change. Because addressing the cultural factor is often central to preventing maternal and infant mortality, there is recognition that appropriate prevention among today’s teenage girls can only be achieved in the long-term through education and awareness-raising, and confidence in the healthcare provided by MSPAS.

A case is considered a “saved life” when a high risk pregnant woman and/or a child are transferred to a health center able to provide them with appropriate care.
TulaSalud, together with DASAV, have recently started a training program for teenage girls with 750 beneficiaries to date. This program is conducted in each community by two female leaders who have been trained in health prevention and promotion, group management techniques and leadership. These female leaders, with remote support from TulaSalud via audio-conferences, work with young people to discuss issues relating to self-esteem, prevention of teenage pregnancies, life-planning and decision-making. To date 98 female leaders have been trained in 49 rural communities in Alta Verapaz.

Since the start of their work, a constant concern for both Tula and TulaSalud has been the institutionalization of project activities. As a result, the project is now controlled by an Advisory Board formed by members of DASAV, ENEC, Cobán Hospital, Tula and TulaSalud. This institutionalization is further evidenced by the fact that the distance training of nursing technicians is directed and fully implemented by ENEC. Although the nursing assistant course is directed by TulaSalud, the teachers are paid directly by the MPSAS and the title is an official ENEC title. Since 2010, the FCs from the telemedicine project no longer operate as independent personnel working in parallel with the FCs of the PSS. Instead, staff from local rural health providers are now trained and provided with technological support. In addition, the staff from the telemedicine module at Cobán Hospital are now paid by the hospital and the initiative is expected to be self-sustainable by the end of 2015.
Figure 1. Relationships between the actors in the model
The “single file” project is a national initiative for registering the activities of the FCs. It is aimed at collecting information about healthcare for common illnesses, with an emphasis on pregnant women and children.

<table>
<thead>
<tr>
<th><strong>TulaSalud</strong></th>
<th>Guatemalan NGO and promoter of the initiative. TulaSalud has installed equipment at each remote site (at an approximate cost of US$2,000 per site) and also covers periodic maintenance.</th>
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<tr>
<td><strong>Department of Health of Alta Verapaz (DASAV)</strong></td>
<td>Identifies intervention areas, selects the providers who will participate in pilot projects, assesses the impact of the initiative, co-funds activities and is gradually assuming supervision of successful services.</td>
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<td><strong>Cobán National School of Nursing (ENEC)</strong></td>
<td>Full responsibility for the distance training of nursing technicians rests with ENEC. The School manages the teachers, technical support staff and the tutor located at the premises, as well as supervises practical classes.</td>
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<tr>
<td><strong>Ministry of Public Health and Social Assistance (MSPAS)</strong></td>
<td>MSPAS is the direct intermediary for all activities performed outside of Alta Verapaz. It sets training standards for the distance learning courses, defines the requirements for computerized epidemiologic surveillance and patient medical history systems, including a “single file” pilot project* for PEC workers, and covers most of the teacher expenses on the distance learning courses (the rest is covered through agreements with other institutions from both inside and outside the country).</td>
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<tr>
<td><strong>Tula Foundation</strong></td>
<td>This Canadian institution has funded most of TulaSalud’s activities and has great interest in continuing to do so. Tula says it is willing to assume risks when a proposal is innovative and has the potential to produce a high social impact.</td>
</tr>
<tr>
<td><strong>Communities</strong></td>
<td>The communities from the areas of intervention are involved in decision-making process related to the initiative. Community Development Councils (cocodes) are briefed about all activities and, in many cases, supervise the work carried out by healthcare personnel and the capacity-building of young teenagers in the X’beil li Kawilal initiative.</td>
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* The “single file” project is a national initiative for registering the activities of the FCs. It is aimed at collecting information about healthcare for common illnesses, with an emphasis on pregnant women and children.
STRUCTURE AND GOVERNANCE

Since 2010, the year in which the telemedicine initiative began to expand throughout the Department of Alta Verapaz, the Project has been governed at strategic level by a consortium comprised of DASAV, ENEC, Cobán Hospital, the Tula Foundation and TulaSalud. As illustrated in the figure below, technical councils are in place at municipal level within every community.

The recruitment of staff for the tele-education work is carried out by both ENEC and TulaSalud. DASAV selects the areas where the work will take place and the PSS choose staff for this directly (FCs and basic healthcare teams). TulaSalud has a number of personnel\(^\text{18}\) including doctors, nurses, engineers and support staff who are well-trained and highly motivated.

Human resource costs have been assumed to a great extent by the Tula Foundation. The remaining amount comes from the contributions of other international cooperation agencies. The respect that TulaSalud personnel have gained, both at high level (DASAV, ENEC, Cobán Hospital

\(^{18}\) In June 2013 the team was composed of 40 people.
and among health centers at secondary level) as well as at community level, is remarkable. A large number of TulaSalud’s personnel speak Q’eqchi’ and some of them also speak Poqomchi’. An additional reason for the respect observed may be that most of their departmental managers have also occupied senior positions at DASAV, ENEC, or in some of the PSS.

TulaSalud has implemented a system for monitoring process indicators (services carried out by the FCs, number of diagnoses, treatment given, urgent transfers, etc.) in real time\(^\text{19}\). This system enables an assessment of FC performance in rural areas by collecting simple aggregated data in order to verify impact.

\section*{INNOVATIVE ASPECTS}

The project uses an approach which integrates systems that have been tested technically and adapted to specific user needs. The telemedicine project, for example, has been implemented where cell phone coverage already existed within the areas prioritized by DASAV\(^\text{20}\). As pilot projects with videoconference facilities were not particularly successful, emphasis has also been placed upon using a voice system, both for inquiries and for the coordination of urgent transfers. The distance training nursing courses are offered by means of a commercial multi-videoconference platform for which the Tula Foundation has been given unlimited project use. In addition, audioconferences for community training are made through phoning a call center which FCs can use without charge.

The design of the Kawok surveillance system for patient and epidemiological control is based on the CommCare platform. This technological pragmatism has allowed TulaSalud to focus on issues such as the suitability of the technology used. Perhaps the most innovative line of work is the portable ultrasound and dry blood screening project which enables nursing technicians at the PSS to detect obstetric emergencies in time using an ultrasound probe connected by USB to a notebook and foldable solar panels\(^\text{21}\).

\begin{footnotesize}
\begin{itemize}
\item [19] \url{http://www.kawok.net}
\item [20] It is worth noting that the cell phone service operators TIGO and CLARO (especially the former) have good rural coverage.
\item [21] This is a small pilot project being carried out among a sample of 1,000 pregnant women attended by four basic health teams.
\end{itemize}
\end{footnotesize}
The most significant **methodological innovation** is the balance between the use of technology and human resources. In this project, technology is used as a tool that works alongside a training process that ensures committed and well-trained individuals are able to solve problems at the end of a telephone line.

Through innovations in working methodologies and **partnerships**, the project has sought from the start to obtain buy-in from the public health system, with special emphasis on reaching decisions by consensus. For TulaSalud and the Tula Foundation it is important that the public health system assumes control of the program in the long-term. In consequence, nothing has been done without the involvement of DASAV and ENEC. TulaSalud also provides the initiative with a flexibility that an institution like MSPAS simply does not have.

With regard to **financial innovation**, the DASAV-ENEC-TulaSalud partnership has enabled a flexible scheme for the gradual assumption of project costs by
the public administration. This process is ongoing and will take time. TulaSalud has played an important role here with its flexible human resource structure and support from the Tula Foundation. This has allowed them to assume the costs of the project from the start, when they were seen as too risky for MSPAS, gradually transferring these as positive results have been achieved\(^{22}\).

**RESULTS**

The project started with 34 distance trained nursing assistants and 20 FC who have become tele-facilitators. It has now trained almost 1,300 professionals (243 technicians, 860 assistants\(^ {23}\) and 178 graduates) 82\% of whom are working in the public healthcare system (1\% are working with NGOs other than the PSS). The project now works from 37 remote sites and has 35 teachers in total.

Of the 860 nursing assistant graduates: 654 are working (76\%), most of them in the public system; 423 in health centers or health posts; and 217 in the most remote program sites in order to extend coverage\(^ {24}\). 15 graduates are working for NGOs, including one with TulaSalud.

At present, 195 community tele-facilitators cover 710 communities (from the districts of Senahú, San Cristobal, Lanquín, Cahabón, Chisec, Fray Bartolomé, Raxruhá, Campur, Carchá and Cobán) and a population of some 330,000 inhabitants. Since the project started, the tele-FCs have carried out: 116,275 medical consultations, 6,783 of which were related to care during pregnancy and childbirth, and 2,014 urgent referrals (298 and 235 classified as obstetric and pediatric "saved lives" respectively).

In the year 2012 alone, the tele-FCs made 12,950 phone calls within TulaSalud’s corporate network\(^ {25}\) which includes other FCs, secondary and tertiary level sites in the Department and TulaSalud’s

\(^{22}\) The technical department of TulaSalud comprises six people and has an annual cost of around 700,000 Quetzales while that of the Health System has another 6 people and an annual cost of around 1 million Quetzales.

\(^{23}\) To visit their facebook page: https://www.facebook.com/groups/egresadoscaec/

\(^{24}\) Data from TulaSalud, 2013.

\(^{25}\) At present TulaSalud has a contract with TiGO (for which it pays around 45,000 Quetzales monthly) which incorporates 235 cell phones and 12 data modems for computers (remote training sites and computers at health centers and hospitals) with unlimited internal calls, 300 minutes of external calls and 250 megabytes of Internet access for each terminal.
staff. In the first quarter of 2013, approximately 3,000 cases were reported via the Kawok health information system.

In 2013, the activities related to health promotion and prevention included a total of seven audio-conferences involving 2,255 people. The X’beil li Kawilal initiative has conducted 28 face-to-face community training sessions supported by four audio-conferences and attended by more than 300 people. Four training workshops for FCs were also conducted in 2013 (one face-to-face and three by distance learning) with the participation of 193 FCs.

As well as the clear impact on healthcare processes, the project has also had an important impact on the health of those covered by the Project. Measuring the reduction of maternal and infant mortality in intervention areas is complicated due to the fact that when data is processed by DASAV it is not disaggregated between those towns with telemedicine and those without. However, maternal mortality in the area of intervention had declined from 309 deaths per every 100,000 live births in 2008, to almost 254 in 2012. This can be compared with the rate for the Department of Alta Verapaz as a whole which has risen from 210 in 2008 to 274 in 2012.

SUSTAINABILITY

While there is still a lot of work to be done to ensure full institutionalization, the TulaSalud telemedicine project shows clear evidence of sustainability. DASAV requested full supervision of “all” FCs in the Department by the end of 2013. This has meant taking over 1,176 communication terminals, with DASAV gradually covering the operating costs for them (400 during the first phase, 800 in the second and 1,176 in the third). Meanwhile, the PEC coordination team within the MSPAS is conducting a pilot study in Alta Verapaz on the computerization of the ‘single file’ care record by the FCs with a view to implementing this nationwide.

In 2013 (the year in which expansion of the telemedicine project grew from 195 tele-FCs to 1,196), the project was managed with a budget of around 39 million Quetzales. This includes contributions from DASAV (69%), the Tula Foundation (28%) and, to a lesser extent, ENEC (1.3%)
The Tula Foundation contributes 11.690.884 Quetzales, the Health Department 27 million Quetzales (approximately), ENEC 200.000 Quetzales and Cobán Hospital 656.000 Quetzales.

In Alta Verapaz alone, 383 reinforced primary care centers will be in place by next year.
For the 295 students registered on the Community Nursing Assistant course, the cost of the training is 611 Quetzales per month for 18 months, which amounts to a total of 10,998 Quetzales per student. In the case of the 257 students on the Health and Nutrition course, the monthly cost is 554 Quetzales per month for six months, amounting to 3,324 Quetzales per student. The average monthly cost of both courses is 582 Quetzales per student (US$73).

The distance training course for nursing technicians provided by ENEC is already financially sustainable. In addition to the basic fee pay (91 Quetzales twice-yearly), the course involves an additional cost of 300 Quetzales per month to cover the costs of staff, transport, practice materials, etc. Students state that this cost is more than reasonable and that they can afford it because almost all of them are working as nursing assistants.

To guarantee the sustainability of their work from the start, considerable efforts have been made by TulaSalud and the Tula Foundation to ensure that the public health system assumes control of the program in the long-term so that the partnership is institutionalized. An Advisory Board composed of all the partners has been established to manage the initiative and promote the active involvement of public health authorities. At the same time ENEC has taken over full responsibility for the training of nursing technicians. Although the nursing assistant course is still directed by TulaSalud, the School issues the qualification, while teachers are paid directly by the Ministry. In the telemedicine work, community facilitators have now been incorporated into the local rural health system and the salaries of staff involved in the telemedicine service are paid by Cobán Hospital. In addition, questions from community facilitators are referred to personnel in the public healthcare system rather than to TulaSalud. The aim is to achieve full sustainability by the end of 2015.

The project is now controlled by an Advisory Board formed by members of DASAV, ENEC, Cobán Hospital, Tula Foundation and TulaSalud. The initiative is expected to be self-sustainable by the end of 2015.
EXTENSION OF THE MODEL

POTENTIAL FOR WIDER APPLICATION

The TulaSalud Telemedicine project uses ICTs to achieve systemic change, both in the provision of culturally relevant services and an understanding of the demand in indigenous areas. The model is appropriate for areas in the Latin American region with similar characteristics.

The project has great potential for scale-up across the country. This is evidenced by the deep interest shown at institutional level. The MSPAS is, for instance, implementing a model of nutritional surveillance for children[^28] using cell phones in eight departments of the country. Although the cell phone is not the same as that used by TulaSalud, the initiative is also based on the use of cell phone technology.

Ongoing financial support from the Tula Foundation for the expansion of the initiative across the country has been crucial. It is, however, not easy to find this kind of budgetary commitment over the long-term in other projects. The Tula Foundation believes that systemic changes cannot be achieved with two or three year long projects because innovative activities require at least a decade to mature. Tula states that they are willing to assume risks if proposals are innovative and able to produce a high social impact. To achieve similarly successful implementation, the case confirms that cooperation agencies need to make long-term commitments to support this type of initiative. Furthermore, only the convergence of all the interventions: short-term (tele-consultations), mid-term (tele-education) and long-term (promotion and prevention with youth) can achieve important changes in healthcare services for the most isolated rural communities in developing countries.

TulaSalud’s achievements are becoming widely recognized. In 2008, they received a prize for best practices in Guatemala from the European Union’s SOLAR-ICT Project for Innovation in the Information Society. They were recently shortlisted for the first prize by the Juan Bautista Gutiérrez Foundation’s “Supporting the supporters” Program[^29]. In 2011, the TulaSalud project also gained recognition from the Spanish International Cooperation Agency for Development’s (AECID in Spanish) Spanish Cooperation Guide as one of the five most outstanding initiatives incorporating

[^28]: Funded by the Fundación TIGO and UNICEF
[^29]: [http://www.fundacionjuanbautistagutierrez.org/content/programa-apoyando-quienes-apoyan](http://www.fundacionjuanbautistagutierrez.org/content/programa-apoyando-quienes-apoyan)
ICTs in health interventions in development cooperation. In terms of impact on the reduction of maternal and infant mortality, the indicators from the project are generating a great deal of interest via their publication in journals such as the *Journal Citation Report*.

### STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS

#### STRENGTHS
- Correct balance between technology and human resources.
- Strong acknowledgement at both institutional and community levels.
- Robust budgetary stability.
- The tele-education program has been very well-accepted nationally.
- Good knowledge of the characteristics and needs of indigenous populations in relation to health.

#### WEAKNESSES
- Over-dependence on financial support from Tula Foundation
- Viewed as an “Alta Verapaz Initiative” because main site is in Cobán.

#### OPPORTUNITIES
- Expansion across the country through the computerization of the “single file” system.
- The right time to find synergies with the strengthening of PEC.
- Interest shown by other international cooperation agencies such as USAID and BID.
- Dissemination of health impact indicators.

#### THREATS
- Technical feasibility and sustainability of exponential growth by the end of 2013.
- Need to monitor the impact of expansion from 195 to 1,196 FC.

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30 [www.aecid.es/galerias/que-hacemos/descargas/GUIA_TIC_SALUD.pdf](www.aecid.es/galerias/que-hacemos/descargas/GUIA_TIC_SALUD.pdf)
**GRAPHIC REPRESENTATION**

### eHEALTH IN RURAL AREAS

**ACCESS TO MEDICAL CARE, TRAINING AND PREVENTION IN GUATEMALA**

TeleHealth shows how access to health in isolated rural communities in Guatemala can be improved by using Information and Communication Technologies (ICTs) within a flexible and horizontal instructor partnership model.

**HEALTH SYSTEMS FOR EXANDARDEZ MINISTRY OF PUBLIC HEALTH AND SOCIAL ASSISTANCE**

**THECBAN NATIONAL SCHOOL OF NURSING (COBAN HOSPITAL), THE TULA FOUNDATION, TULCAHUAD**

### EDUCATION

- Training of nursing technicians and assistants in rural communities in coordination with the Coban National School of Nursing.
- Students come from the local rural communities.

**1,282**
- Nursing technicians, assistants and Upmoon.
- Certified Teleface-To-One training.

**37**
- Remote training centers.

**35**
- Teachers involved in distance training.

### MEDICINE

- A community tele-facilitator (FC) attends to patients.
- The FCs communicate with doctors by call, phone and email, and send medical information.
- Staff who speak indigenous languages carry out medical consultations 24 hours a day through the telemedicine module in Coban Hospital.

**195**
- FCs have a cell phone and laptop.

**710**
- Rural communities.

**PREVENTION**

- Through the X’bel li Kawsch initiative, female community leaders train young adolescents in health promotion and prevention.

**2,014**
- Emergency transfers.

**6,783**
- Link-ups for pregnant women.

**116,275**
- Medical consultations.

This publication can be downloaded in PDF format on the following link:

Healthcare in isolated rural areas in developing countries can be improved using ICTs providing these are backed-up by well-trained and motivated personnel with a clear understanding of the needs and the reality of the rural areas.

The success of telemedicine projects such as the one conducted by TulaSalud can only be achieved with the active backing of Departmental authorities and the explicit support of the relevant Ministry.

Cross-sector partnerships in this type of project are crucial. In the case of TulaSalud, the contributions of ENEC and DASAV have contributed to the success of both the tele-education and telemedicine work from the start. The vision of gradually institutionalizing the services is clearly important.

Work in isolated rural areas (especially with indigenous people) should be culturally appropriate and respond to the needs of the population. Support from the community towards the training of local personnel is crucial.

A success factor of TulaSalud’s distance training program is the presence of an academic tutor in the remote sites who supervises the process at all times (class attendance, approach, motivation, conflict resolution, etc.).

The institutionalization of a telemedicine project such as TulaSalud’s (in rural areas of developing countries) needs long-term funding support from the beginning. The Tula Foundation claims that systemic changes in this type of project are only produced after at least ten years.

Support from international cooperation agencies (such as the Tula Foundation) provides the initiative with financial stability (giving time for the incorporation of necessary funds from public budgets) and staff (enabling specific technical assistance for a limited period).

The computerization of the epidemiologic surveillance system and oversight of healthcare activities enable real-time monitoring of the initiative, and the possibility of using results-based management strategies.
REFERENCES


The links included in this publication were all accessed in July 2014.
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