



**SOCIAL
INNOVATION
IN HEALTH
INITIATIVE**

MAMA RIVER PROGRAM: AN INITIATIVE BEYOND BORDERS

CONTINENT	South America
COUNTRY	Peru
HEALTH FOCUS	Community-based health, Primary Care
AREAS OF INTEREST	Maternal health, Community-based health, Intercultural health
HEALTH SYSTEM FOCUS	Provision of services



MAMA RIVER PROGRAM: AN INITIATIVE BEYOND BORDERS

Implementer: Cayetano Heredia Peruvian University
Operations: Peru

The Department of Loreto in the Amazon region of Peru has one of the highest maternal and infant mortality rates in the country. Up to 80% of women give birth in their homes and infection is a leading cause of neonatal death. Health facilities are difficult to access, and most are understaffed, poorly equipped, and often lack basic infrastructure.

Community health workers (CHWs) and traditional birth attendants are trained to promote essential newborn care practices during home deliveries when health facility-based deliveries are not feasible. CHWs conduct regular home visits to pregnant women and mothers with newborns; during these visits, they distribute paper materials and clean delivery kits. They use tablet computers with a mobile application to help monitor women's health status and to provide education related to maternal and newborn health.

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MAMÁS DEL RÍO: UNA INICIATIVA MÁS ALLÁ DE LAS FRONTERAS

Implementador: Universidad Peruana Cayetano Heredia
País de operaciones: Perú

El departamento de Loreto en el Amazonas peruano tiene una de las tasas de mortalidad materna e infantil más altas del Perú. Hasta el 80% de las mujeres dan a luz en casa y la infección es la principal causa de muerte neonatal. Las instalaciones de salud son de difícil acceso y la mayoría carece de personal, está mal equipada y a menudo carece de infraestructura básica.

El Programa Mamás del Río, cuenta con un grupo de agentes comunitarios de salud (ACS) y parteras tradicionales capacitados para promover prácticas esenciales de atención al recién nacido durante los partos en el hogar, en caso de que el parto en el centro de salud no sea factible. Los agentes comunitarios de salud realizan visitas domiciliarias a mujeres embarazadas y madres con recién nacidos durante las cuales distribuyen materiales educativos en papel, equipos de parto limpio y usan tabletas con una aplicación móvil para ayudar a monitorear el estado de salud y proporcionar contenido educativo relacionado con la salud materna y neonatal.

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This case study forms part of the Social Innovation in Health Initiative Case Collection. This case study was prepared by CIDEIM. Research was conducted in 2019. This account reflects the stage of the social innovation at that time.

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For more information on SIHI and to read other cases in the SIHI Case Collection, visit www.socialinnovationinhealth.org. The SIHI network is supported by TDR, the Special Programme for Research and Training in Tropical Disease, co-sponsored by UNDP, UNICEF, the World Bank and WHO. TDR is able to conduct its work thanks to the commitment and support from a variety of funders. For the full list of TDR donors, please see: <https://www.who.int/tdr/about/funding/en/>. TDR receives additional funding from Sida, the Swedish International Development Cooperation Agency, to support SIHI.

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ABBREVIATIONS

CHWs	Community health workers
AFC	Agents Against Covid-19
PHC	Primary Healthcare
CONCYTEC	National Council of Science and Technology and Technological Innovation
DIRESA	Regional Health Authority
EsSalud	Social Health Insurance
INEI	National Institute of Statistics and Informatics
MDR	Multi Drug Resistance
NGO	Non-Governmental Organization
PAHO	Pan American Health Organization
SIS	Comprehensive Healthcare Insurance
TB	Tuberculosis
UNICEF	The United Nations Children's Fund
CHPU	Cayetano Heredia Peruvian University
HIV	Human Immunodeficiency Virus
XDR	(Extensively drug-resistant); associated with extremely resistant TB.

CASE INTRODUCTION

The Department of Loreto, whose capital city is Iquitos, is located in the Amazon region in northwestern Peru. It shares its borders with Ecuador and Colombia to the north, Brazil to the east, the Department of Ucayali to the south and Department of San Martín and the Amazon rainforest to the west. It has an area of 368,852 km², equivalent to 28% of the national territory, making it the largest region in Peru (UNICEF, 2019). The rural communities of Loreto are confined by the five main rivers that run through the region: Huallaga, Marañón, Napo, Ucayali and Amazonas. The latter is formed from the confluence of the Marañón and Ucayali rivers (SENAMHI, 2011)



Source: Mama River, 2019

There are eight provinces and 53 districts in Loreto, with a total of 1,068,132 inhabitants,

with children and adolescents constituting 39% by 2018 (INEI, 2017a). The Department has the largest indigenous population in the Peruvian Amazon region which, according to the 2017 census, corresponds to 105,900 inhabitants who speak 27 native languages. Loreto is therefore the most linguistically diverse region in the country.

Within the region, the government has been unable to guarantee the services required for many of its communities, especially those necessary for the rural population to live a healthy life. As a consequence, the basic rights of the population have been significantly disregarded, and disparities and inequalities persist despite the fact that Peru is a medium-high income country. Economic poverty in Loreto continues to be above the national average and is estimated at 35.1% (UNICEF, 2019), indicating the unequal distribution of resources and opportunities for development affecting segments of the population.

Loreto is under the public management of the Regional Health Authority (DIRESA), which in its analysis of health in 2015, recognizes the main causes of morbidity and mortality as shown in Table 1 below. The health indicators in Loreto are higher than national rates despite that there is considerable under-registration.

Table 1. Disease and death in Loreto, Peru

Causes of disease	Rate per 100.000	Causes of death	Rate per 100.000
Tuberculosis	134	Communicable diseases	107.3
Malaria	5.674	Neoplasms such as tumors and Carcinoma in situ	108.4
Dengue fever	157	Circulatory system diseases	105.4
HIV and AIDS	3.7	Other causes or external causes	50
Chronic Malnutrition	23% ¹		

Source: Analysis of the health situation in Loreto, 2015.

¹ Malnutrition is expressed in percentage (%) different from the other causes of diseases data.

In Loreto, DIRESA (Dirección Regional de Salud, 2015) reports that only 60% of births are attended by healthcare professionals. In addition, the number of pregnancies among young women between ages 15 and 19 has reached 33%; for the country as a whole, this indicator is 14%.

Neonatal mortality in Loreto is the second highest in Peru. From 2013 to 2014, it amounted to 17 per 1,000 live births, even when the newborn was at a healthy weight for gestational age (Ávila et al., 2015). Further, while infant mortality (under 1 year of age) has declined over the years from 60.6 to 29.5 per 1,000 live births between 1995 and 2015, the neonatal mortality rate appears to have stayed constant (INEI, 2017).

Health conditions in the region threaten both maternal and child health, as shown by the high rates of pregnant women and children under 5 years of age affected by malaria, dengue fever, and Zika virus (Centro de Prevención y Control de Enfermedades, 2018). Researchers from Cayetano Heredia Peruvian University (CHPU) have noted that “in the rural areas of the Loreto region within the Peruvian Amazon, the maternal mortality rate is above the national average and most women give birth at home without the care of a trained health care provider” (Limaye et al., 2018). Postpartum hemorrhage is still a leading cause of death.

One of the things that surprised me the most was that 80% of women gave birth at home and about 5% of women lose their babies. I mean, since they've been pregnant, 5% lose their babies. [...] also 71% of women, we found either didn't want to have their children or would have wanted to delay the last pregnancy they had. So, the rate of unwanted pregnancies was very high (M. Blas, innovator, Lima, Peru, 2019).

Situations such as these caught the attention of a small group of CHPU health professionals. They noted that despite the efforts of

government entities to promote access to health services, a high percentage of women in rural riverside areas continued to deliver at home rather than travel to health facilities for multiple reasons. These included long distances between communities and health centers, transportation difficulties, cultural preferences, and limited economic resources or ability to mobilize and assume costs of staying out of the community. In addition, health facilities had limited medical staff and resources (Limaye et al., 2018).

In order to improve the conditions of maternal and child health in rural communities of Loreto, the Mama River program emerged. This initiative seeks to improve the relationship between families, communities and health care personnel, with the mediation of CHWs, in health centers in the region.

The program began in 2015 after a series of visits to indigenous communities in Loreto by the innovator Magaly Blas and other researchers from CHPU. Magaly, as a doctor, woman and mother, began to raise questions about the health disparities visible among pregnant women from the community, and about the shortcomings and limitations that these women experienced during pregnancy and childbirth. Her questions brought to light differences between the reality of these women and the opportunities that she and many other women have in urban areas, especially in capital cities, during pregnancy, childbirth and early motherhood.

I became a mom and I said wow, if I have all these vulnerabilities and feelings as a mom, even though I receive attention here in Lima, it was amazing to see the moms in the rural areas of the [Peruvian Amazon] river giving birth at home, with their midwife or with their partner or their mom and sometimes alone, with all the risk of dying! So that's when [...] I said, no, now I'm going to do something different. (M. Blas, innovator, Lima, Peru, 2019).

The participation and concern of the communities in the program, the articulation between health entities and the communities, the increase of pregnant women's participation in prenatal control programs in health facilities and the inclusion of technology in the hands of CHWs, among other accomplishments, encouraged the team, health organizations and funders to continue the program. The initiative has expanded from its initial intervention in the Nauta, Parinari and Saquena communities in Loreto to communities on the Peruvian-Colombian border within the scope of the Fund for the Development of Border Integration, led

by the Ministry of Foreign Affairs and the Ministry of Health in Peru and Colombia.

The use of technological tools and work with the community allows us to serve a population that is not normally covered by conventional health systems. These are values that we always emphasize when we mention the Mama River Program; for us, Mamas of the Border (J. Lossio, Directorate of Border Development and Integration, Lima, Peru, 2019).

1. INNOVATION PROFILE AT A GLANCE

Project Details

Project name	Mama River Program. An initiative beyond borders
Foundation	2015
Founder's name	Magaly Blas
Founder's nationality	Peru
Organizations involved	Private: Cayetano Heredia Peruvian University (CHPU) Public: National Science Council, Technology and Technological Innovation (CONCYTEC), Loreto's Regional Health Authority (DIRESA), Ministry of Foreign Affairs and the Ministry of Health in Peru and Colombia Nonprofit: Grand Challenges Canada.
Organizational structure	Spin Off from Cayetano Heredia Peruvian University
Team members	An average of 10 people and 84 CHW

Innovation Cost

Value proposition	Improvement of maternal and neonatal health in rural communities of the Peruvian Amazon, by training CHWs midwives and local health staff to provide care for pregnant women and newborns.
Beneficiaries	Families from 84 communities in the districts of Nauta, Parinari and Saquena in the Department of Loreto, Peru; families from 30 communities from the districts of Teniente Manuel Clavero and Putumayo in Peru; and Puerto Leguizamo and San Rafael in Colombia.
Key components	<ul style="list-style-type: none">• Community health education• CHW training• E-Health (mobile technology)• Participation and community empowerment

Operational Details

Main income sources	Funding through national and international calls for proposals and institutional support from government organizations.
Annual expenditure	US \$157.500. These costs may vary according to the objectives and specific needs of the program to implement its processes

Scaling up and Transferability

Operational coverage Department of Loreto (Peruvian Amazon) with an estimated population of 1,068,132 inhabitants in 2018, according to the 2017 national census projections.

Local commitment Local health authorities and staff, DIRESA.

Scalability Mama River program has defined as a roadmap for scalability:

- The implementation of the initiative Mamas of the Border within the framework of the Fund for the Development of Border Integration in communities on the Colombian-Peruvian border.
- The articulation of the program with public health policies of the DIRESA in Loreto and the National Ministry of Health to be implemented also in other rural communities.
- Consolidation of the non-profit civil association, *Ikara* (Innovation and Knowledge for Health) to advance the objectives of Mama River and Mamas of the Border.

Sustainability Innovators have planned for the sustainability of the Mama River Program through the following mechanisms:

- Become legally constituted as a non-profit association.
- Establish collaborative partnerships with different public and private institutions for the provision of operational services and training to health care personnel.
- Apply for funding through opportunities by participating in national and international calls and tenders.

2. CHALLENGES

Loreto is far from the capital, Lima, and is one of the least densely populated regions of the country (Ramal et al., 2009). It is mainly accessed by plane, although there is access to the region from some cities and provinces by sailing on the Amazon River and its tributaries. Iquitos, the capital of Loreto, lacks roads that connect it to other cities excepting one road of approximately 115 km that links Loreto with Nauta. A significant number of communities are located along riverbanks. The constrained mobility of inhabitants limit their access to urban centers and to health and education services.

According to a UNDP report (PNUD, 2019), the Department of Loreto, although it has reduced some poverty indicators, is still unequal in terms of quality of life of its inhabitants compared with other departments of the country.

Not one of the communities we work with has access to electricity, drinking water or sewage and many of them are the locals that have benefitted from the 'Juntos Program, a conditional transfer program for people in extreme poverty [...] the only thing the locals receive is what the Peruvian government gives them for this program, which is about \$30 a month for the whole family' (M.Blas, innovator Iquitos, Loreto, 2019).

The Department of Loreto faces significant challenges associated with institutional weakness, limited financial resources, and poor control over natural resources. The region has very limited capacity to resolve internal conflict, satisfy the basic needs of its inhabitants and offer them productive employment opportunities. In rural areas especially, there are no policies to utilize resources and boost the economy.

According to the National Household Survey (ENAHU), Loreto has a poverty rate between 33% and 36%, which situates it in the second

poorest group of departments of the country (INEI, 2019). The INEI Report (INEI, 2020) states that in 2018, 39 of Loreto's 53 districts were in the highest poverty range. Among these were Saquena and Parinari, two of the districts which received help from the Mama River Program.

This region is home to 32 of Peru's 71 indigenous peoples, and about 30 native languages are spoken there. The indigenous population of Loreto is equivalent to more than 18% of the total population (INEI, 2017a). Loreto is therefore a region in which local cultural beliefs and practices are predominant, and these significantly influence the ways in which health processes, particularly pregnancy and childbirth, are attended to and understood as life processes.

Given poverty and isolation, the population of Loreto, especially its rural communities, are vulnerable. Structural factors impact maternal and child health outcomes. The region has one of the highest mortality rates in Peru, partly because of the high percentage of women who deliver at home. Home births are influenced by cultural beliefs and practices, deficiencies in the health system that generate mistrust, distance between communities and health care centers, and the scarcity of economic resources and transport infrastructure to travel to health care centers. These conditions endanger the health of mothers and newborns, among whom the high risk of infection often leads to death.

In addition, there are deficiencies in the health system and care services. Most hospitals are understaffed, poorly equipped, and often lack basic infrastructure, as one DIRESA official explained: *We do not do things as we should, we do not have a budget to cover our entire jurisdiction, we do not have the capacity to have pregnant women monitored in the communities, we lack resources, we lack a budget* (GR. Mesa, DIRESA, Iquitos, Perú, 2019). Health centers lack the capacity to provide culturally appropriate quality care for mothers and newborns, and some studies

suggest poor hygienic conditions in newborn care practices, both at home and in facilities (Reinders et al., 2018).

The Mama River program arose in response to various health needs and barriers in rural communities such as Nauta, Saquena and Parinari. It was led by a group of CHPU researchers interested in the maternal and infant health of families, who found that home birth, assisted by midwives and family members, was the best way to give birth, *Brave women give birth at home; the cowards go to the health center* (from visual material of the CHWs Program, 2020).

The main objectives and strategies of Mama River to improve maternal and child health and to strengthen the health system in the region were: to rely on CHWs and trained midwives to adequately accompany pregnant women and newborns; to provide home support to pregnant women and their families before and after delivery; and to offer tools for birth planning by promoting the attendance of pregnant women and newborns in health centers, *the main focus of this project is on CHWs and traditional midwives, training them and using different training resources, including the use of digital technological tools such as tablets for recording information on pregnant women and newborns.* (L. Huicho, CHPU, Lima, Peru, 2019).

3. INNOVATION IN INTERVENTION AND IMPLEMENTATION

Mama River is a program that aims to improve maternal and neonatal health in the most remote communities of the Peruvian Amazon (S. Mori, local coordinator, Nauta, Loreto, 2019). In order to achieve these objectives, the program

developed its actions based on three fundamental pillars: a) community awareness, b) training of health personnel, and c) accompaniment and training of CHWs and midwives (Figure 1).

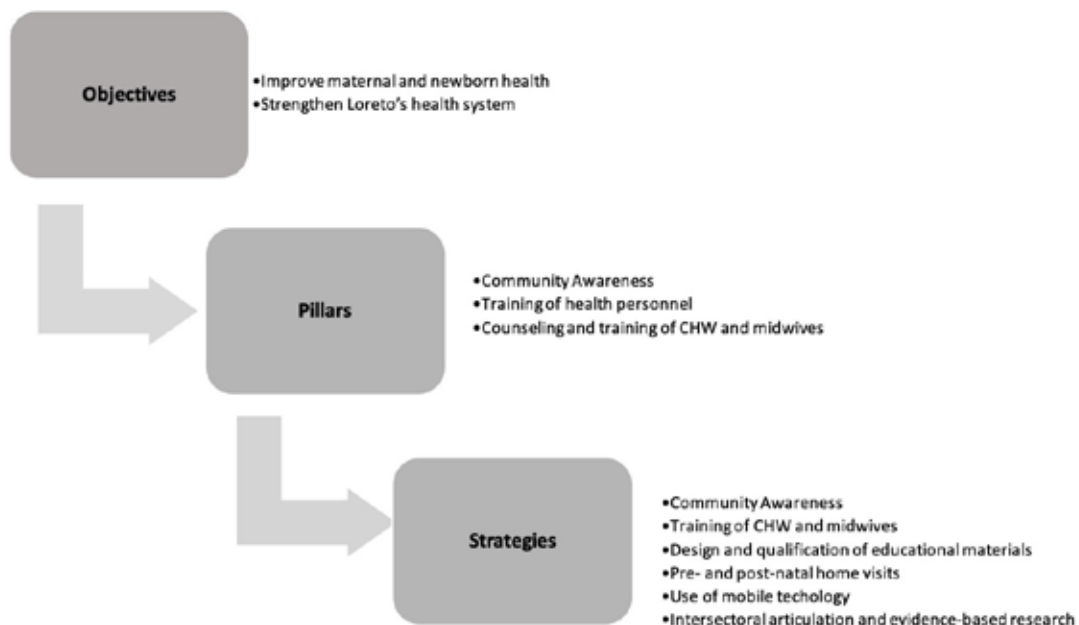


Figure 1. General diagram of the initiative

As program collaborators explained, Mama River is a comprehensive initiative that has articulated diverse approaches and strategies

to improve maternal and neonatal health in 84 rural communities in Nauta, Saquena and Parinari in Loreto since 2015. Its implementation

has undergone four phases. The pilot project was conducted in 13 communities of the Parinari district between 2015 and 2016. This evaluated the viability of developing the program in a rural Amazonian context; based on this experience, a new version of the program was developed. A second pilot was introduced in four communities of the district of Parinari with the new version of the program, with the aim of extending activities to 79 more communities, each distant from the other:

Travel from Lima to Iquitos by plane, go to Nauta taking two hours on the highway, and then head to Parinari which is 4 to 5 hours from Nauta using a glider². Then meet the CHW and start that first part of the pilot with the training of the agents and then with the midwives (A.Alva, program coordinator, Lima, Peru, 2019).

Mama River was then implemented in the 84 communities. The fourth phase was to determine the scalability of program as a binational initiative on the Colombian-Peruvian border. The main components and strategies, which capture the essence of participation and complexity of the program, are:

3.1. COMMUNITY AWARENESS, A STRATEGY TO REACH OUT TO COMMUNITIES

We raise awareness with every leader in every community [...] to get their support so that the CHWs do their work, then we raise awareness within the whole community, mostly with the men to tell them that there is a CHW who is a man most of the time, and that he is going to visit his wife, so to please open the door for him, (M.Blas, Innovator, Nauta, Loreto,2019).

The purpose of awareness building is to invite community members to identify pregnant women early, by referring them to CHWs for testing. Awareness is also conducted by CHWs

to motivate women in their reproductive years to notify the family and health center about pregnancy. Using Beto, a baby doll, CHWs illustrate to mothers the importance of immediate care and attention of the newborn. At the same time, awareness is raised with the health personnel of the care centers, encouraging them to accept CHWs and stressing the importance of a link between all actors involved in the program.

3.2. TRAINING OF CHWS AND MIDWIVES TO IMPROVE MATERNAL AND CHILD CARE IN COMMUNITIES

With the direct involvement of traditional community leaders and authorities, 84 CHWs were selected by the communities:

It is the community that chooses the community agent to participate in this training (S. Mori, local coordinator, Nauta, Loreto, 2019).

This group of community leaders takes on the responsibility of acting as CHW volunteers. They are trained and included in the Mama River team to develop measures for women and their partners before and after the birth. CHWs perform pregnancy tests; collaborate with the midwives in the preparation for birth and care when the mothers choose to give birth at home. They mediate between pregnant women and care centers in order to encourage prenatal care and institutional delivery, and perform electronic registration of data related to pregnancy, delivery and the newborn's condition, which is collected by the community leaders during pre- and post-delivery follow-up visits.

The interaction to train CHWs is very particular; they are people who we have to guide so that they understand the objectives of the program and can make the visits. (A.Alva, program coordinator, Lima, Peru, 2019).

² The glider is a kind of motorized boat that provides water transportation to communities living along the riverbanks.

In small groups, CHWs and midwives learn about pregnancy and childbirth in a playful and context-specific way. With the midwives specifically, the training process seeks to improve their ancestral practices of assisting in childbirth to reduce the risks of infection and death for mothers and newborns. Finally, they receive a "clean delivery kit" for those pregnant women who decide to give birth at home.

The community worker during visit number three trains who is going to be the midwife on how to use the clean delivery kit given through the program during the eighth month of gestation (A.Alva, Program coordinator, Lima, Peru, 2019).

3.3. DESIGN AND QUALIFICATION OF EDUCATIONAL MATERIAL: BETO IS THE STAR

In four posters that are hung in visible places during domiciliary visits to pregnant women, the team explicitly points out maternal and neonatal danger signs and recommendations to seek immediate care in case of complications. Along with the posters, the team provides three educational booklets and a clean delivery kit to those ready to assist deliveries in the community when the mother has chosen to deliver at home. These good health practices are reinforced by the CHWs during home visits, through the guide offered on the tablet application and educational videos that illustrate the experiences of pregnant women and mothers with newborn babies. This is an educational strategy based on the experiences of mothers and communities, in their context and daily life where the program is implemented. These videos can be accessed on the program's website under the tab Nuestras Historias (Limaye et al., 2018).

In the middle of the training, Beto appears. This doll is similar in size to a newborn baby, and is conceived as a real baby for the CHWs, midwives and families. Beto receives care and

is used by program members to teach good hygiene and care practices at birth and during the first days of infancy.

To dry up the baby, cutting the umbilical cord with a sterile instrument, putting the baby skin-to-skin with the mother, giving colostrum [early breastfeeding], weighing the baby on the day of birth, not applying harmful substances to the umbilical cord, and only feeding the baby breast milk for the first three days. These are the practices we all learn (German and Alex, CHW, Puerto Prado, Nauta, 2019).

3.4. HOME VISITS BEFORE AND AFTER BIRTH

The CHWs, properly trained and equipped with their tablets, posters and other educational materials, rapid pregnancy tests, and a scale, among other items, conduct home visits to pregnant women, which are scheduled with others in the family, making sure that the person who will attend the birth is present, whether that is the midwife, mother, sister or partner.

This activity is considered the core of the program. It consists of three visits during pregnancy and three after delivery. In the former, the aims are to promote the importance of early prenatal check-ups and institutional delivery, and to educate mothers and families about childbirth preparation and essential and general care for the newborn. In addition, if home delivery is the first option, CHWs assist in the preparation of the birth through direct communication with the midwife or the person who will assist her.³ During postpartum visits, the mother and newborn are supported in their care; the baby is weighed, the importance of breastfeeding and skin-to-skin contact of the babies with their mother is emphasized, and the care of the navel and alarm signs to ensure the well-being of the newborn are highlighted.

³ There are communities that do not have a traditional midwife; however, they often ask their husbands, mothers or close relatives

to be the person who can assist the delivery. This request is usually regarded as an honorable endeavor with great responsibility and commitment in the community.

Mama River conducts the visits to the pregnant women during their labor period and seven days after the delivery; because of that, we train for 5 days (R. Curitiba, Puerto Prado, Nauta, 2020).

3.5. THE USE OF MOBILE TECHNOLOGY: A CHALLENGE FOR THE CHWS

While many of the CHWs were not familiar with mobile touch technologies, the Mama River team made an effort to equip them with a tablet and train them in a personalized way to use the application. This application was designed to register general information about the condition of the pregnant woman and the newborn during follow-up visits at home and to show educational material in the format of images and videos to the pregnant woman and her family.

The information is collected by the team's supervisors in the communities during follow-up and support visits they make periodically to CHWs. Later, program technical staff enter this information into a database and share it with DIRESA and other corresponding health agencies to facilitate decision-making on maternal and newborn care and to improve the registration of maternal and child health at the local and national levels.

That part was a challenge for us because many people have not handled a tablet or a mobile phone this way, [...] there are some people that we have to support even more, so, we have been working over the months with the supervisors that we have in the field (A.Alva, Program Coordinator, Lima, Peru, 2019).

3.6. INTERSECTORAL ARTICULATION AND EVIDENCE-BASED RESEARCH

Teamwork has been a key principle at Mama River. Working in alignment with local government plans and DIRESA's priorities in Loreto has been a constant in order to reduce the disparities in maternal and child health throughout the region. Actions are coordinated with the Ministries of Health, Education, and Development and Social Inclusion. They are also coordinated with academia and private sector organizations.

The program builds its strategies and protocols from the systematic review of scientific evidence in other countries and regions of the world.

Every component is evidence-based, from the protocol design to the materials provided to the CHW. I am talking about worldwide evidence, studies on the effect of home visits by CHWs on the reduction of neonatal mortality conducted in similar settings, mainly in Africa and Asia. (M.Blas, Innovator, Lima, Peru, 2019).

Research is a crosscutting component in the Mama River Program, and this has facilitated the pursuit of funding with research entities such as CONCYTEC Peru. Among these processes, formative research on newborn care practices, studies to measure changes in these practices, and the evaluation of processes and components supported by mixed methodologies, are included.

4. ORGANIZATION AND PEOPLE

The program has a multidisciplinary team that operates on three levels and has 94 members, not including the midwives who are also key players in the process.

4.1. MAIN TEAM: LEADING THE WAY IN INNOVATION

This team operates from Lima under the leadership of founder Magaly Blas. She is accompanied in her functions of creating, administering, managing resources, implementing and analyzing data by an evaluation and development director and two regional coordinators. She is also accompanied by a commercial director who acts as a business consultant. *Now we are undergoing a restructuring process and yes, G. is acting as a 'venture advisor' in that area [...] of business, in the commercial direction* (M.Blas, Innovator, Iquitos, Loreto, 2019).

This multidisciplinary team includes five people, with backgrounds in medicine, nursing, obstetrics, epidemiology, statistics, communications and public health, to work on the mission to *improve maternal and child health by empowering CHWs through the use of Information and communication technology* (Mama River, mamasdelrio.org/es/ 2020).

4.2. LOCAL TEAM: LEADING THE IMPLEMENTATION IN LORETO

The main team is strategically coordinated from Lima with the second level of implementation, the local team, which is integrated by five people, who are responsible for accompanying and following up with the CHWs of the 84 beneficiary communities of the program. This local team provides the CHWs, materials and necessary inputs for activities, and checks the

quality of the registered information in the tablet.

Each supervisor is in charge of different communities. All 84 Mama River communities are divided into four groups: Nauta, Parinari, Saquena, and Parinauta-Nauta [...] and they [the supervisors] visit the communities that are assigned to them once a month (M.Blas, Innovator, Lima, Peru, 2019).

The main and local teams are on the payroll of the CHPU, as it is the institution to which the initiative is attached; the innovator Magaly Blas and her collaborators are teacher-researchers at this university. The CHPU receives funding resources from CONCYTEC, Peru and Grand Challenges Canada.

4.3. COMMUNITY HEALTH WORKERS: VOLUNTEERS WITH SOCIAL RESPONSIBILITY

This operational level of the program is the core of the initiative, as referred to by Mama River team members. There are 84 CHWs, one for each community. *The most important component of Mama River is the CHW team. So, a CHW is the one who carries out the early detection of pregnancies, but also the home visits. This is the core of the program [...]* (M. Blas, founder, Nauta, Loreto, 2020).

The CHWs are parents with a leadership role recognized by their communities and chosen by them to be involved in the program. The communities have given priority to health promoters with previous training on the topic.

In the communities they have made an invitation to the authorities [...], then, they have invited the health promoters, and since I am the health promoter it is the same, the name is changed to CHW. In all the communities we have CHW but almost all of them are

men because generally, it is men who have also been trained to administer the medicines as health promoters (J. Mozambite, CHW, Puerto Prado, Nauta, 2019).

Selected and having accepted the role as volunteers without any economic benefit or working relationship with the program, CHWs are trained in specific issues of maternal and neonatal health, including the technological management of the application and the tablet for adequate recording of the information. In addition, they are accompanied by supervisors

5. OUTPUTS AND OUTCOMES

5.1 A HUMANIZED AND CLEAN DELIVERY: A NEW LOOK TO THE ART OF MIDWIFERY

Midwifery has been a traditional practice in rural communities, generally assumed by women who are mothers and who have worked with co-mothers and relatives to raise their children. Mama River recognizes the importance of midwives when access to healthcare is restricted by disparities that obstruct institutional delivery.

The program is committed to recognizing the very act of midwifery, because when communities do not have a traditional midwives and institutional delivery is not feasible, another person close to the pregnant woman will assist with the home birth. Such recognition is reflected in the collaboration of midwives and CHWs, working together with pregnant women, newborns and families. A special emphasis is placed on the qualification of the midwives as they integrate new practices to the activity of midwifery and promote the use of sterile materials.

and the local coordinator of the program. Some CHWs belong to the Cocama-Cocamilla indigenous people. They are local leaders with personal and collective motivations to become part of the initiative.

Knowing the health conditions of my community, I accepted to continue training myself, and thanks to the program I was able to motivate the mothers to value their children, before they were born and lost their lives,, and nothing was said to the mothers who did not come to the health center because they were afraid (F. Pacaya, CHW, Nauta, Loreto, 2019)

Now midwives do not use the red aseptic on the umbilical cord [...], they dry the baby quickly, make a clean cut of the cord three minutes after it stops beating, they understand the importance of skin-to-skin contact and early breastfeeding to take advantage of colostrum⁴. (M. Teagua, CHW, Nauta, Loreto, 2019).

5.2. CHWS: A DRIVE FOR THE INSTALLED CAPACITY OF THE PROGRAM

The CHWs are actors who are born and live in their communities, and work for the health of their fellow community members. The 84 agents are well known leaders and many of them have been previously trained and designated as health promoters. This circumstance contributes to the process of empowerment and active participation of the communities and their leaders.

The training of the CHWs, their articulation with health personnel of the health centers, the

⁴ Colostrum is the breast milk produced by the mammary glands during pregnancy and the first few days after birth. It is considered to provide a rich source of nutrients for the newborn.

provision of educational and technological materials, and their permanence in the community, are all elements that help the sustainability of the community process even in the absence of Mama River personnel. In some cases, their motivations are associated with personal experiences as parents, which helps embed CHWs into the program.

I am in this program because of the love I have for it; I lost my son and it hurts a lot and that motivated me. That's why it caught my attention and I liked it a lot. I do this job with so much affection. [...] We don't have any [economic] compensation, but because of the knowledge that will remain with us, we will pass it on to our children and to other people. (R. Curitiba, CHW, Puerto Prado, Nauta, 2020).

5.3. IMPACT ON ACCESS TO HEALTH SERVICES AND THE REDUCTION OF MATERNAL AND NEWBORN MORTALITY

Now there are fewer deaths of babies; the achievement of my community is also that we have changed, we attend more prenatal check-ups and births at the health center, that is another achievement, [...] the health workers with the guidance do tests, and we can tell them in that moment if they are pregnant. We provide guidance, and in this way we prevent deaths and so many things that can happen. (G. Pacaya, CHW, Puerto Prado, Nauta, 2019).

The community perceives that the program has succeeded in reducing the number of maternal and neonatal deaths thanks to the good practices adopted in home delivery. It has also improved the relationship between communities and care centers, and consequently this has increased the number of pregnant women who attend prenatal control and are willing to accept institutional delivery. In the pilot study alone (phase I, 2015-2016), prenatal care in the first trimester of pregnancy increased from 38 to 63%, and institutional delivery from 16 to 37%. The percentage of women who applied to have their baby

registered at birth rose from 2 to 30% in the first 30 days of life; this is necessary to obtain a national identity card and it facilitates access to health and education (Application SIHI LAC Hub, 2019).

As a result, babies are more likely to receive vaccinations from birth, and mothers and their caregivers are more educated about risk factors for their own and their newborn's health. The support of the CHWs to the community and their mediation with health personnel has allowed timely care for mothers and babies.

5.4. AN INNOVATIVE SOLUTION WITH REPLICATION POSSIBILITIES IN LATIN AMERICA

Mama River connects important principles of social innovation and technological innovation in health. The promotion of community participation and empowerment achieved through direct work with leaders is a strength that reiterates that maternal and child health is a need felt by the institutions and communities of Loreto where the initiative is implemented.

Articulating technology, health education and real community actors are key elements when seeking the ultimate goal of innovation – the social transformation of health in these communities, with the generation and implementation of solutions based on specific contexts.

Innovation is understood not only as technological development, but as improvement of health processes. That is why I believe that this process of strengthening people recognized by the community itself allows us to develop in a better way what is expected from the health sector. (J.Lossio, Ministry of Foreign Affairs, Lima, Peru, 2019).

Maternal and child health can be compromised in rural communities in low- and middle-income countries that experience social inequalities and disparities in access to health. This initiative has the potential to be replicated in other Latin

American countries with similar challenges that impact access to health, although a prior analysis of the context and recognition of the particularities of each population is essential.

5.5. ARTICULATION OF ACTORS: A CHALLENGE FOR ANY SOCIAL INNOVATION IN HEALTH

The program succeeds in motivating intersectoral, interdisciplinary and inter-institutional dialogue. Even more importantly, through the CHWs it achieves important mediation between health personnel, researchers and communities. This is a crucial

element for any innovation. In this case, it promotes social transformation in health at different social levels. It also involves decision makers by providing them with important information and evidence on maternal and child health as a problem recognized at both national and regional levels.

Through the training that we have provided to the health personnel of the health centers ... they have adapted their services to some cultural customs related to childbirth, which has allowed a better and effective approach of the mothers with the health centers. This is a great step to improve the care. (Application SIHI-LAC Hub, 2019)

6. SUSTAINABILITY AND SCALABILITY

The Mama River program is a solution to a specific need of the communities as also recognized by public and private organizations. This need derives from the geographical isolation of the communities, social inequality, negligence of the state, lack of resources and infrastructure in health. It has become an alternative with important contributions to maternal and child health, and it has wide possibilities of replication and scalability both inside and outside Peru. The scalability of the initiative is projected in three principle ways.

A strategy aimed at articulating the program with the health system

From the program's origins, the innovators aimed at staying in the region. It was intended to move from a pilot study to a scaling up phase between 2015 and 2018, which allowed the team to have sources of funding per phase, scaling up from four to 84 communities in three districts of Loreto.

The initiative was undertaken jointly with DIRESA and other national health entities, and seeks to work together to generate installed capacity. To achieve this goal, they count on a

group of qualified CHWs, midwives, supervisors and a local coordinator to give continuity to the actions in favor of maternal and child health.

What we have agreed on in the last few meetings is the transfer of technology from Mama River to us. We are incorporating specialized personnel to the Mama River team so that they can start preparing. (GR. Mesa, DIRESA, Iquitos, Loreto, 2019).

From Mama River to Mamas of the Border

The outputs and outcomes of Mama River in the Peruvian Amazon region have raised the interest of other ministries and initiatives. The Directorate of Development and Border Integration of the Ministry of Foreign Affairs of Peru is responsible for articulating the different ministries to provide programs and services to the border populations in socio-economic, environmental, health and institutional strengthening issues to support sustainable development in different sectors. In addition, it is in charge of identifying binational mechanisms with the countries sharing a border with Peru. In this context, some common projects are being developed with Colombia, financed by a binational fund. Among these is

Mamas of the Border, which seeks to implement the main actions of Mama River in Colombian and Peruvian communities to improve maternal and child health in border communities where there are significant health access disparities.

The impact of Mama River was significant in that it had achieved a strong alliance with local authorities and communities, and had a great synergy between local health promoters. The positive impact was evident. So we thought that the context was similar to that of the border shared with Colombia, in this case with the native communities, we could replicate the experience there. (A. StaCruz, Ministry of Foreign Affairs, Lima, Peru, 2019).

The following steps are necessary for approval to replicate the initiative on the Brazilian and Ecuadorian borders.

Use of technology to address the Covid-19 pandemic

Given the Covid-19 pandemic, Mama River has taken on the challenge of reinventing itself. The program obtained funding from the National Council of Science and Technology (CONCYTEC) to implement the project Agents Against Covid (AFC) in peri-urban areas of the city of Nauta. A group of CHWs between 13 and 30 years of age, who do not present any comorbidity that would make them particularly vulnerable to the virus, was selected.

These CHW, with the support of the technological tool, looked for suspicious cases of infection in Loreto to reduce contagion in this region. They received remuneration for their activities, personal protection, basic supplies to take temperatures, and a tablet to register information. This information helped decision makers develop appropriate intervention strategies (Berríos, 2020). In addition, the program obtained funding from Grand Challenges Canada to work on an adaptation of the AFC project in the river communities where they currently operate.

Sustainability (Cachay & Delgado, 2018), articulated to scalability, has been characterized by national and international scholarships and grants that have paved the way for its consolidation as the program it is today, mainly, CONCYTEC and Grand Challenge Canada. Administrative and financial sustainability is based on the way the initiative and its components have been expanding, according to diverse needs and social realities in health.

We work on several fronts... one is the government, but if they don't take the program, we're not going to disappear. (M.Blas, Innovator, Lima, Peru, 2019).

Three routes are planned to achieve their permanence:

Identification of national and international calls

The team regards the callings as a permanent opportunity to obtain resources that will allow them to continue operating. The window of opportunity offered by Grand Challenge Canada remains an option to participate in what the innovators call an innovation marketplace, where they can make themselves visible to different international funding agencies.

Going from a spinoff to a civil association

The CHPU was the platform from which the program receives and administers resources from CONCYTEC, Grand Challenges Canada and the Binational Fund Peru-Colombia, which has also provided support for its operation as a spinoff. Once this was done, the challenge was to create a non-profit civil association to scale the initiative and make it more independent. *Ikara*, Innovation and Knowledge for Health, seeks to have different versions of the program operating in diverse contexts where health disparities and social inequity jeopardize maternal and newborn health.

Mama River as a social franchise

Within two or three years, this initiative may have its components identified and structured as independent products that will be offered to

organizations interested in the health of rural communities, within and beyond Peru. This is expected to be offered as a social franchise, so that other institutions will be able to totally or partially implement the program under the guidance of *Ikara*. This will enable the program

7. KEY LESSONS

The successful experience of Mama River has satisfied innovators and implementers in general because of the achievements and impact achieved in the program as a result of the articulation of sectors, disciplines, institutions and community leaders. The direct work with CHWs who were selected and recognized by the community, and who are concerned about the health and integral well-being of their communities, adds value to the initiative. CHWs not only achieve the specific objectives to improve maternal and neonatal health, but also have an impact on the empowerment and participation of local populations, strengthen the social fabric, and build capacity in terms of health in the communities.

In the five years of program development, the innovators have learned that institutional birth from the hegemonic discourse of health is the ideal, and it is seen by the health system as the first option to improve access to health and reduce maternal and neonatal mortality in Loreto. However, in many cases, home birth remains the preferred alternative for families who find it an opportunity to welcome new members in the cozy and trustworthy environment of their homes. Midwives and midwifery practice are a legitimate option for communities as part of their culture and local customs. As a result, the team identifies the need to qualify this process by providing women with a clean and safe delivery with less risk of infection and avoidable deaths. It has been important to reflect on how to ensure that home birth is respected as a community

to generate community benefits from its proven experience and operation, while allowing a profit to keep operating and strengthen the brand of *Ikara* and Mama River as a flagship product.

practice and an option for families, without leading them to assume that home birth is being encouraged over institutional birth. The original proposal for the project maintained a permanent dialogue with funders, traditional authorities, community leaders, health personnel and decision-makers in Loreto, which motivated a community-based development program with socio-culturally tailored strategies to respond to the actual needs and concerns of the families in the communities. This has required a constant process of qualification, adjustments, re-adaptation and the generation of mechanisms for the systematic evaluation and registration of processes and their components. The innovators recognize the importance of adapting the program and its different versions to the new contexts where it can be replicated. The program's scalability and sustainability have paved the way for its structuring by shifting from an academic framework offered by the university to a business idea of a civil association.

Mama River has significant characteristics that are compatible with the Social Innovation in Health approach. It is a solution developed by individuals and institutions from different sectors to collaborate with communities and leaders from a creative perspective. The program goes beyond the conventional practices to reduce maternal and neonatal mortality and improve access to health in the communities of Nauta, Saquena and Parinari in an inclusive, effective and affordable manner.

CASE INSIGHTS

Remote rural communities often find their own ways of responding to their health needs and problems. In this case, women have managed pregnancy and given birth at home, accompanied by midwives or, in their absence, by their husbands, mothers or close relatives. Through the management and commitment of the CHWs as mediators between communities and health institutions, it has been possible to improve the safety of home birth, reducing the risks of maternal and neonatal mortality associated with home delivery while encouraging gestational control and institutional birth.

Through this process, communities have proven their ability to adopt good health practices without opposing traditional practices in their culture. Preventing risks during pregnancy, ensuring clean deliveries, making an adequate cut of the umbilical cord, seeking medical attention for potential hazards that could affect the mother and the baby, promoting skin-to-skin contact between mothers and babies at birth, and practicing early breastfeeding to provide colostrum to the newborn, are all now in the communities' mindset. This illustrates the possibility of engaging with traditional and ancestral knowledge in order to improve maternal and child health and access to health.

Mama River is an innovative strategy based on three important aspects: the training of CHWs and midwives; the strengthening of health institutions based on the recognition of CHWs and the socio-cultural characteristics of the communities; and the use of mobile technology for the timely registration of information. It serves as a tool for decision makers in the generation of programs and policies for maternal and child health in Loreto, Peru and now in communities that share a border with Colombia.

The volunteer work of the CHWs has been promoted by Mama River, providing opportunities and recognition to these social actors. Their work results in the strengthening of community participation and empowerment. The initiative contributes significantly to the social transformation of the communities, without being exclusively limited to achieving its objectives of reducing mortality and access to health services.

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