An evaluation of the integration of an mHealth program into the Ministry of Health in Timor-Leste

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Abstract

An evaluation of the integration of an mHealth program into the Ministry of Health in Timor-Leste

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Introduction: mHealth programs have been shown in many health settings to be effective for short-term goals. However, the integration of such programs into sustainable structures within ministries of health has not been well documented. The Liga Inan mHealth program in Timor-Leste was developed by two non-governmental organizations (NGO) in partnership with the Ministry of Health (MoH) to strengthen maternal and newborn care services. The Liga Inan program is being scaled up nationally, and the process of program handover has been initiated in selected districts. This evaluation focuses on long-term sustainability of Liga Inan by assessing the process and results of handover of the program in three districts, identifying the opportunities and challenges of integrating mHealth interventions into the Timor-Leste public health system.

Methods: A qualitative method evaluation compared utilization indicators for Liga Inan during a twelve-month period before and after the handover. Key informant interviews with stakeholders from government, NGO partners, donors, telecommunication service provider, and community leaders examined perceptions regarding the process of program handover. A program integration framework was used to guide the inquiry.

Findings: Enrollment rates of pregnant women into the program were relatively steady, although substantial declines were observed for broadcast messaging by district health facility staff. Factors reported to facilitate the process of handover include a supportive policy environment for mHealth, government ownership, technical expertise of NGOs, and partnerships with community, private sector, and donors. However, there is a lack of clear communication among partners and lack of adequate technical and management capacity of MoH staff. Other key factors such as adapting to national political transitions, different operational environment of MoH and NGOs, MoH staff turnover also limit this process. Estimating the resources needed and establishing plans for maintaining the phones and covering other ongoing costs of the project will be required for achieving a successful transition.

Discussion: Liga Inan continues to function during the transition to MoH management in these three districts. However, achieving a full handover of the program will require addressing several limiting factors. It is recommended that NGO partners need to develop clearly defined partnerships with each other and with the MoH for a fully effective transition and program sustainability. A transition plan outlining program costs, human resource requirements, their respective suggested duties, and transition timeline should be developed and shared among partners. Maintaining partnership with telecommunication service providers and ensuring financial commitments from the donor partners are essential to facilitate this transition process.

Introduction

Mobile phone ownership in low- and middle-income countries (LMIC) has proliferated in recent years. According to the International Telecommunication Union, the penetration of mobile phone adoption in LMICs reached 102.8 subscriptions per 100 inhabitants in 2018.[1] As mobile services are increasingly prevalent, their potential as tools for sustainable development in the agricultural, health, and financial sectors, where they can act as tools to decrease information gaps and empower individuals, is becoming widely recognized.[2]

In the health sector, innovative mobile technology has begun to shift the paradigm of health care access and service delivery.[3] The connectivity between local health staff and families who live in rural areas can be greatly improved through cellular networks, overcoming the lack of infrastructure in other areas, such as roads and landlines. According to the WHO's global survey for mHealth, various global mHealth initiatives include sending appointment reminders through voice or text messages and sending text messaging for health promotion or to alert target groups of health campaigns.[4] For health surveillance efforts, mobile phones can be utilized as tools to input and transmit data. In addition, they can be used for communication and consultation between doctors about patients using voice, text, data, imaging, or video.

While most mHealth interventions have produced promising results, they have often been small pilot efforts managed by research institutions and nongovernmental organizations (NGOs), neglecting critical elements that would be needed for sustainable implementation and scale up.[5,6,7] These mHealth initiatives are often at a standstill and prone to termination as external funding ends.[5] A 2012 review of mHealth programs in LMICs suggested that the delivery of maternal and newborn care can be improved by incorporating mHealth into an existing, comprehensive service approach. However, it also revealed the paucity of project evaluations and a general lack of management and policy frameworks for guiding and coordinating the adoption of mHealth services into the broader health system with the exception of a few programs, such as Mom Connect in South Africa and Aponjon in Bangladesh.[8] Evaluations that focus on long-term program sustainability, identifying the opportunities and challenges of integrating mHealth interventions into mainstream public health services, are badly needed.

In Timor-Leste two NGOs, Health Alliance International (HAI) and Catalpa International, have implemented an mHealth program known as Liga Inan, or "connecting mothers" in the local language, that focuses on maternal and newborn health. These organizations work closely with the Ministry of Health (MoH) and engage with them at all stages of program implementation. Two years following full implementation in one district, HAI conducted an impact evaluation and found that mothers in the Liga Inan implementation district had nearly twice the odds of having a facility delivery and five times the odds of receiving a timely postpartum visit, compared to mothers in an adjacent control district (controlling for other factors).[9] The MoH carried out their own independent evaluation of the Liga Inan program that also showed very positive results.[10] These two evaluations influenced the MoH to authorize national expansion of the program, with integration into the public health sector and eventual full handover to the MoH. At the time of this study, the process of program handover had been initiated in four districts. However, full handover, characterized by independent management and financing by the MoH, is still in process.

This has prompted a study that aims to add to the limited body of literature on sustainability of mHealth efforts by evaluating the transition of an mHealth program in Timor-Leste from NGO to the MoH management. It aims to assess the extent to which utilization of Liga Inan has been maintained in

districts where the program has been handed over to the MoH, examine facilitating and limiting factors that influence the integration of the program into the public health system, and determine appropriate practices for key stakeholders to further strengthen the handover of the Liga Inan program into the MoH.

Background

Timor-Leste is a Southeast Asian country situated in the eastern half of the island of Timor with a population of approximately 1.3 million people, with 69.4% of whom residing in rural areas.[11,12] In 1999 following 24 years of repressive Indonesian occupation, the departing military forces disrupted health by severely damaging or destroying one-third of health care facilities.[13] An assessment conducted in January 2000 found that two-thirds of health care facilities were without electricity, approximately half were without water, and 67% lacked essential medical equipment.[14]

In addition to lack of adequate access to health services, poverty further contributes to high maternal and neonatal mortality rates. The 2010 Demographic and Health Survey (DHS) reported that the maternal mortality ratio was 557 per 100,000 birth, and neonatal mortality was 22 per 1000 live births.[15] Antenatal care (ANC) coverage with four or more visits was 55% (63% in urban, 53% in rural), and only 29% of births were attended by a skilled provider (59% in urban, 20% in rural).[16] Research in Timor-Leste suggested that barriers to accessing essential health services consist of geographic, cultural, and socioeconomic factors, as well as adequate knowledge of the benefits of care, and gaps in communication and transportation.[17]

These health issues prompted HAI and Catalpa International to partner with the MoH to seek an innovative solution to address barriers to accessing and utilizing health services for women during pregnancy, delivery, and postnatal periods. Mobile phone ownership has rapidly increased even among households in rural districts in Timor-Leste. This reality creates new opportunities for mHealth programs as a viable means to transmit health information and establish linkage between health staff and the families they serve.

In 2012, HAI and Catalpa International partnered with the MoH to develop and implement the *Liga Inan* mHealth program. Liga Inan connects women to health information and provides reminders to seek maternal health services through text messages and facilitated voice communication. Midwives and doctors enroll pregnant women into the Liga Inan at their first ANC visit and they immediately begin receiving twice weekly text messages through six months postpartum. If they have any problems, concerns, or go into labor, they can contact their health facility staff through the Liga Inan service platform. Every week, the platform provides midwives and doctors a list of enrolled mothers who are close to their due date, which triggers a phone call from the midwife or the doctor to the mothers to check in regarding the families' birth plan. In addition, midwives and doctors can send broadcast messages to their obstetric patients as additional health promotion messages, or to inform about a change in the clinic schedule. To support the program a Liga Inan dedicated Android phone is provided to every health facility and ten dollars of monthly phone credit provided to every health staff engaged in registering women into the program and tasked with interfacing with the Liga Inan service platform.

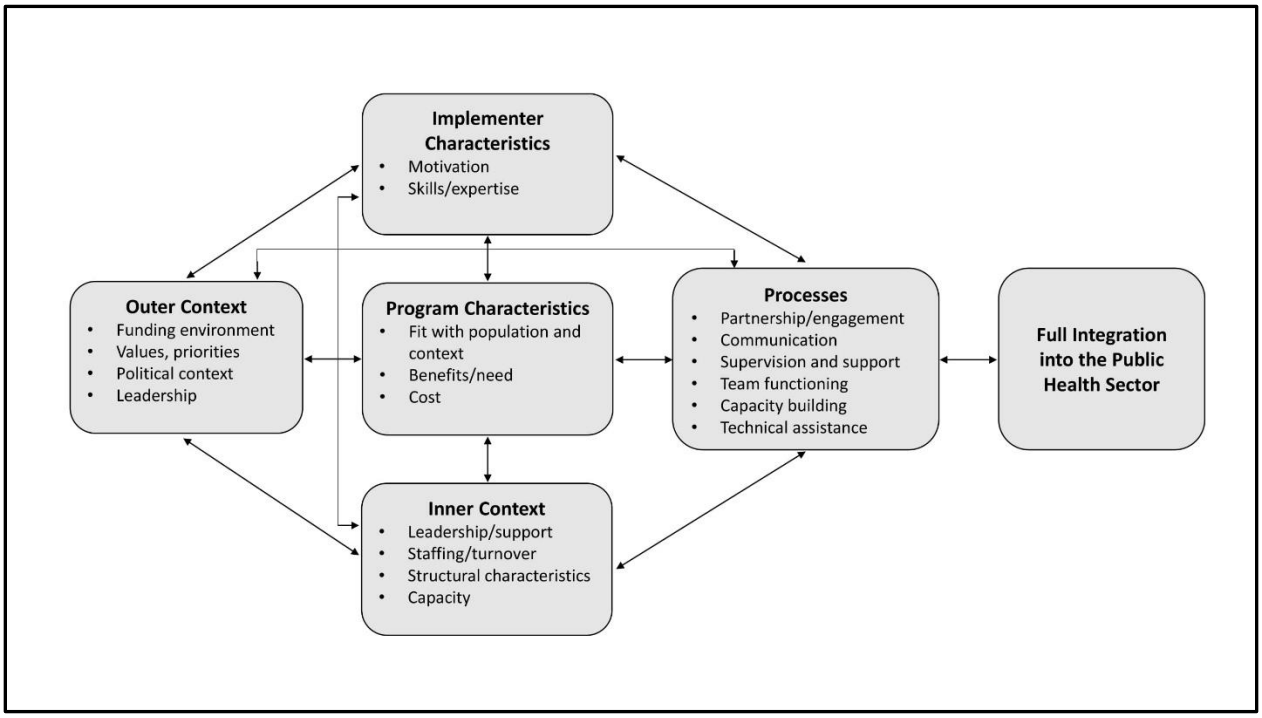
During the first four years of Liga Inan implementation in the first district, Manufahi, HAI provided intense technical and managerial assistance to the program, with a small office in that district. After the transition of Liga Inan management to the MoH, HAI's on the ground and face-to-face support, such as

monitoring and evaluation visits, is reduced to only once per year. During these annual visits, HAI's monitoring and evaluation team work with district health directors in presenting their Liga Inan performance statistics and facilitating reflection sessions, allowing district health staff to identify good practices and solutions to their challenges together. HAI also continues to be responsible for phone maintenance and replacement. After the process of program handover has been initiated in specific districts, HAI continues to provide basic technical support and program performance monitoring through a dedicated hotline, where district staff call with questions or concerns or to seek technical assistance on any Liga Inan function.

Conceptual Framework for Program Integration

A program integration framework was adapted from Shelton et al's (2018) integrated sustainability framework. This model guided the evaluation questions of key stakeholders' perceptions regarding the handover of the Liga Inan program and their relevance in the processes.[18] This framework highlights the dynamic interactions between key multilevel factors that the emerging evidence from implementation science suggest are important for facilitating program integration and sustainability.[18] These factors can be classified into five broad categories: characteristics of the program, characteristics of the implementing partners, outer context, inner context, and processes.

Figure 1: Program Integration Framework



In this model, the outer context refers to the environment outside the boundaries of the implementing partners, such as community ownership, funding environment, priorities and leadership of the external partners (government and donors), and political context. Inner context refers to organizational environment within which program implementation and handover take place. It consists of organizational leadership and support, human resources readiness and turnover, and organizational structure of the MoH. Characteristics of the implementers refer to organizational motivation, skills, and

expertise. Characteristics of the program or intervention itself refer to the degree that the program fits with population and local context, beneficiaries' perceived needs and benefits, and program cost. The dynamic interactions between these factors affect a set of processes that occurs across organizations including partnership/engagement, communication, capacity building of MoH staff, team functioning, support and supervision, and technical assistance. These processes ultimately determine the degree that the program can be fully integrated into the public health sector and ensure long-term implementation.

Methods

A qualitative evaluation was conducted in three rural districts, Manufahi, Aileu, and Liquica, where management of the Liga Inan program had been handed over to the MoH for at least twelve months. Program performance indicators were observed for the twelve-month time periods immediately before and after the handover of Liga Inan. They include the numbers of 1) pregnant women enrolled in Liga Inan and 2) 'broadcast' messages sent by district health facility staff to their patients enrolled in Liga Inan. These data were obtained from the Liga Inan Dashboard, a system that manages the data transmitted from the Liga Inan phones in the district health facilities.

Twenty-six semi-structured interviews were conducted with key stakeholder groups contributing to and participating in the Liga Inan program. These groups include: national MoH senior leadership (3), staff of two NGO partners (7), donor partners (3), a telecommunication service provider (1), district MoH management staff (6), district health facility staff (3), and community leaders (3). These interviews were conducted in respondents' places of work over eight weeks from July to August 2018.

The sampling frame for key stakeholders working in national MoH, NGO partners, in-country donor partners, and telecommunication service provider were individuals deemed to be important decision makers or subject matter experts. The sampling frame for district MoH management staff included individuals who managed the Liga Inan program in the district health offices. The sampling frame for district health facility staff included individuals who implemented the Liga Inan program on the ground, and for community leaders included local leaders who were aware of Liga Inan within their communities. For the selections of district health facility staff and community leaders, sub-districts exhibiting moderate performance on program indicators were selected (rather than high or low performers).

The sampling strategy used to identify key stakeholders was purposive quota sampling of mutually exclusive key informant groups.[19] This approach allowed the evaluation to capture and equally value the range of their perspectives, from key decision makers to representatives of communities where women participated in the Liga Inan program.

Semi-structured interviews were used for this evaluation because they allowed the principal investigator to explore specific issues related to the transition to full handover to the MoH, employ probes and appropriate follow-up questions, and allowed key informant's experience to guide the discussion. The key informant question guide was developed to inquire about participants' perspectives on Liga Inan program implementation, their perspectives on the process of hand over, and their recommendations for how s could improve the process to achieve full handover of the Liga Inan program. Key questions were similar across key stakeholder groups in order to compare and contrast their perspectives on the same topics. However, some questions were specific to key informants' roles and experiences as a MoH decision maker, a program implementer, or community leader. The content of the question guides was

reviewed by a group of experienced NGO staff for cultural appropriateness and accuracy of the terminology. The guides were field-tested with these NGO staff and appropriate revisions were made based on their feedback.

The interviews were conducted in English and Tetum, depending on the key informants' preference. Prior to the interviews, an English-Tetum interpreter was briefed about the scope of the evaluation and was trained in technical terminology for the Liga Inan program. For interviews conducted in Tetum, conversations were translated back and forth by the interpreter in real time, and the interviews were all recorded by an audio recording device. Interpreter's translation errors were detected and corrected in the transcription process by experienced HAI staff.

Data Analysis

Both English and Tetum interviews were recorded and transcribed in full. Transcripts in Tetum were translated into English by a group of experienced NGO staff. Data were managed and analyzed by the principal investigator using ATLAS ti 8 (version 8.3, Scientific Software Development GmbH, 2018). Coding of themes involved a mix of applying open coding and a priori thematic coding from a start list based on the Program Integration Framework.[20] Memos were written to record analytical dialogues that informed subsequent data interpretation. Exemplar quotes were identified from each interview to demonstrate similarities and differences in perspectives. Emerging themes were incorporated in a working analytical framework, and the finalized framework was assessed by a secondary reviewer. Any discrepancy that arose during this process was noted, discussed, and modifications made.

Ethical considerations

Ethics approval was obtained through the Timor-Leste National Institute of Health. This evaluation project was exempted from the Human Subjects Division of the University of Washington. With assistance from the translator, the principal investigator informed the participants about the objectives of the evaluation, method, benefits, confidentiality, and participants' rights as a volunteer. The interview was carried out once the participant provided a written consent to participate and record the interview.

Findings

Two key Liga Inan indicators from Aileu, Manufahi, and Liquica districts were observed for the same 12-month time periods before and after management handover to MoH took place. The indicators were the numbers of pregnant women enrolled in the program and the number of broadcast messages sent by health facility staff to their patients. From the semi-structured interviews, the principal investigator queried key stakeholders' perspective of a full, successful handover and drew on the program integration framework to target determinants to identify and describe factors that influence the process of handover of the Liga Inan program to the public health sector.

Utilization of Liga Inan before and after the handover

As seen in *Figure 2,* numbers of pregnant women enrolled in the program are relatively steady in all districts. Total enrollments in Manufahi District in the same 12-month time period (4/2015-3/2016, 4/2016-3/2017) before and after program handover shows steady enrollment with only a 4.43% decline.

In Aileu District, total enrollments in the same 12-month time period (4/2016-3/2017, 4/2017-3/2018) before and after program handover show a greater decline of 9.01%. In Liquica District, enrollments in the same 12-month time period (11/2015-10/2016, 11/2016-10/2017) before and after program handover also show a greater decline of 8.22%.

Figure 3 shows substantial declines for the number of broadcast message sent by district health facility staff in all three districts. Declines in Aileu and Liquica districts (lower by 30.28% and 34.36% respectively) are greater than those in Manufahi District (17.79% lower).

Figure 2: Comparison of the number of pregnant women enrolled in Liga Inan in the same 12-month time period before and after program handover to MoH management

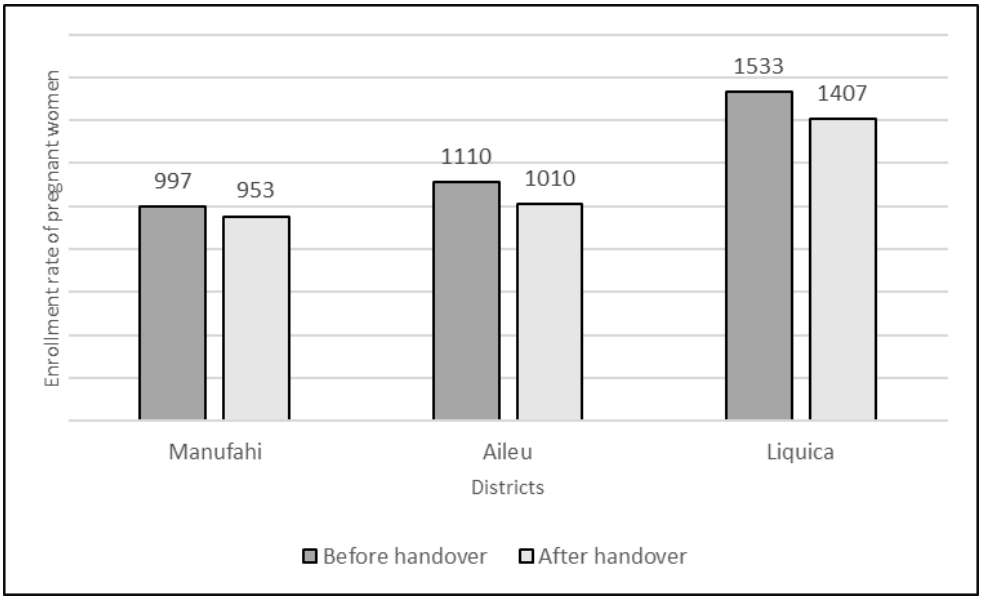
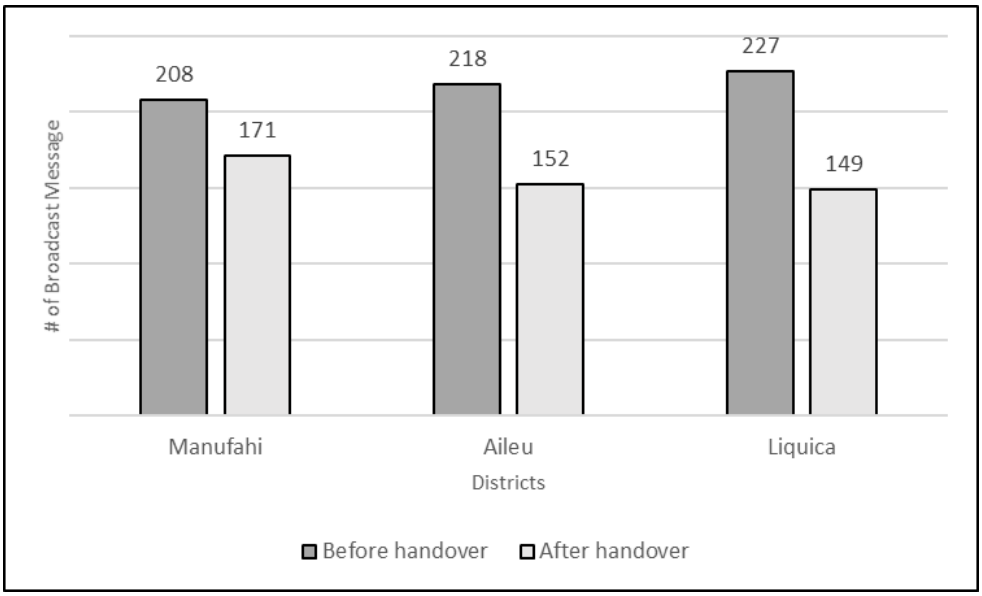


Figure 3: Comparison of number of broadcast message sent by district health facility staff in the same 12-month time period before and after program handover to the MoH management



Defining a successful full handover of Liga Inan program to the MoH

Key stakeholders unanimously suggested that achieving a successful handover would require a lengthy process. They anticipated that the outcome of this process would be the establishment of clear management teams at the national and district MoH levels.

In the national MoH, the Liga Inan program could be managed by a consortium of departments that provide essential functions for the Liga Inan program, including supportive supervision, training resources for district staff, monitoring and evaluation, technical support, phone maintenance, procurement of the Liga Inan phones and credits, and financing.

A number of differing organizational structures were suggested by the key stakeholders from the national MoH for where the staff member with key responsibilities (the "focal point") should be based:

- Department of Health Policy perspective: Liga Inan focal point should situate within the Information Technology (IT) department and Health Management Information System (HMIS) office. Other departments provide essential support, including finance, Maternal and Child Health (MCH), health promotion, logistics, and procurement.
- Department of Health Promotion perspective: Liga Inan focal point should be managed by the Health Promotion Department. It would seek technical support from the MCH and IT departments, funding from the finance department, and phone purchase and maintenance from the procurement department.
- Department of MCH perspective: Liga Inan focal point can be situated in the MCH department and supported by the IT, health promotion, procurement, and finance departments.

Respondents agreed that the Liga Inan program could be primarily managed at the level of the district MoH by the District Public Health Officer (DPHO) for MCH, under the direct supervision of the District Health Director. District MoH respondents suggested that additional staff should be assigned to work closely with the DPHO to perform district management responsibilities, such as providing direct supervision, training, and monitoring and evaluation to district health facility staff tasked with implementing Liga Inan and serving as an intermediary between national MoH and district health facility staff.

Key stakeholders also expressed the value of continuing the partnership between the MoH and NGO partners even after full handover to the MoH. It was suggested that HAI and Catalpa could provide additional technical support and consultation services if requested by the MoH.

As the Program Director from HAI explained:

"We (HAI) are a partner of the Ministry of Health. If in the future, the Ministry of Health wants to review or revise the messages or wants to add more messages, I think HAI is ready to guide them because developing messages is a long process. There needs to be a draft [of messages], consultation [with partners], field testing, and translation. HAI has a lot of experience in developing all the [Liga Inan] messages."

The Director of Catalpa stated:

"From the technical side of the program, once you've created a platform, the Ministry of Health doesn't have to absorb those (costs) because they are done now. The only costs you have ongoing are some maintenance [and]…security updates."

Factors that influence the process of handover

Partnership and engagement

Respondents agreed that the Liga Inan program was grounded in strong collaborations not just between NGOs but also with public and private sectors. These partnerships, built on shared priorities and values, were described as key factors that facilitate the process of handover. HAI and Catalpa respondents reported that they seek to optimally utilize the mHealth platform to address poor utilization of health services for women. They also emphasized the importance of adoption of this program into the public health system in achieving a sustainable implementation. Donor partners reported that they consider the Liga Inan program valuable because it aligns well with their strategic health design that focuses on improving maternal, newborn, and child health services. They also expressed a strong support for the handover process as a proper development approach, and one that would contribute to the stability and the prosperity of Timor-Leste. The Liga Inan program also was said to align with the MoH's National Strategic Health Plan. The MoH Director of Health Policy noted:

"It is one of the important programs that contributes to the reduction of maternal and child mortality. The MoH will continue to support this function. I expect NGO partners to transfer ownership to the Timorese. So, perhaps the sustainability of the program will be seen in the future."

District MoH management staff and donor partners also suggested that community engagement plays an important role in the process of handover. Community leaders, known as *chefe suku*, are embedded in government and interpersonal networks in the local communities. They possess the understanding of local context and the ability to promote community cohesion. The Program Manager from Australian Government's Department of Foreign Affairs and Trade (DFAT, a donor partner) explained:

"With the Liga Inan, we empower communities by involving the chefe suku. They engage the community and make sure the community is aware of the program. Community members in the rural areas would listen to their leader."

Collaborating with community leaders who are motivated and have a shared vision on the promotion of the Liga Inan program created better buy-in from community members in the districts.

One HAI respondent suggested that maintaining positive partnership with the telecommunication service providers is a key facilitating factor for the handover process because it offsets costs, reducing financial burden for program implementation. A telecommunication service provider respondent explained:

"Liga Inan is a social project for mothers. We really want to support them (implementing partners) to solve the (technical) problems. They (management team) agreed to offer one reduced price for sending large quantity of SMS to mothers all over the country. And after one year of contract, I think we can work together to discuss which way they (implementing partners) can offer and which way we can offer, such as giving a special promotion."

At the national level, key stakeholders from the MoH reported that differences in the operational environments between NGOs and the MoH could hinder the progress of program handover. Most NGO-run projects are financed by donor partners that put emphasis on timely results and accountability. To ensure funding streams from the donor, implementing partners must comply with project timelines. Working with such fast-paced timelines can be challenging for the MoH because it operates based on its strategic plans and the politics of the government. The MoH also has health programs with many other

organizations, such as UNICEF, WHO, UNFPA, and John Snow Incorporated, each with their own work plans and deadlines. As the Director of Health Promotion explained:

"We (MoH) are getting tired and sickened in managing and making sure all health programs are being implemented based on the plan."

Communication

Most key stakeholders' responses suggested that while communication between implementing partners have been adequate for continuing program implementation and transferring a number of responsibilities to the MoH, it is still not ideal, and this factor influences the process of handover. On the positive side, donor partners maintain a close communication with the NGO implementing partners in order to monitor and evaluate the progress of the Liga Inan program. They have informed the MoH about the outcomes of Liga Inan and how it works synergistically with other health programs. But often the communication is not regularly scheduled or planned, but rather involves sharing updates with the MoH mostly when specific needs or opportunities arise.

NGO implementing partners' routine meetings and coordination have helped them to produce positive implementation outcomes. However, donor partner and NGO respondents expressed concerns about a lack of clarity regarding how program sustainability is defined and the lack of a clear roadmap for full handover. As the Liga Inan program is in the process of scaling-up, a roadmap developed early in the implementation process became less relevant. The Health Program Manager from Catalpa noted:

"We created a working document where we've identified what sustainability looks like for us: what do we need to know or what do we need to fix or what do we need more clarity on in order to take it forward. But that document got stalled."

There were some concerns that the lack of cohesive communication and implementation plans between NGO implementing partners could be a barrier to shared and transparent decision-making processes. Their working separately could ultimately affect communication with other partners. At times, the MoH received conflicting information from each NGO partner. One NGO respondent noted:

"It could make the government confused because one organization comes out with one thing and another organization comes out with another thing. Which one is correct?"

Government Ownership

Most key stakeholders suggested that the support and engagement from the MoH leadership at both the district and national levels have facilitated the process of handover. At the national level, MoH senior leadership has demonstrated tremendous interest in working with the other key stakeholders on Liga Inan program implementation. The former Minister of Health supported its incorporation into the national health strategy for maternal and child health. Other senior MoH staff have taken part in promotional events with the implementing partners in the districts. They also have supported funding allocation for specific program expenses, such as phone credit and cost of some text messages. District health staff have demonstrated a significant level of cooperation with NGO staff in coordinating and delivering a number of training sessions, ceremonies, and monitoring and evaluation activities.

However, these engagements are still inadequate to achieve a full handover. According to district health facility staff, they have not received adequate support from the national MoH after NGO implementing

partners decreased the on-the-ground support at the time of handover. A midwife from Manufahi District noted,

"Since this program handed over to the MoH, we haven't gotten any specific meeting or supervision from the national or district level related to the Liga Inan program."

The Health Director from Liquica District noted,

"People from the national MoH haven't come to see the progress of the Liga Inan program. The kind of supervision and evaluation process from the national team is not the same as Catalpa and HAI. They are not specifically focused on Liga Inan activities."

Functional upper-level MoH management that would oversee the program operation is essential, yet currently absent. In addition, a significant portion of program expenses is still covered by donor funding through the NGO partners. Most MoH staff recognized these ownership gaps and showed interest in collaborating with the NGO partners to work towards a full handover.

Team Functioning

National MoH staff suggested that while working with multiple departments within the Ministry on the Liga Inan program is feasible, coordination and decision-making can be challenging because every department has its own priorities and interests. In addition, they reported that procurement of phone credit and android phones, which would be needed for a successful Liga Inan program, would require a complex process for procurement managed by a separate governmental department.

Most key stakeholders agreed that successfully implementing a national program within the MoH that includes sufficient human resource allocation comes with several challenges. The Director of Catalpa noted,

"Supporting any national program is just logistically challenging. How do you provide orientation to incoming staff? How do you do refresher training for the churn of health staff? How do you do performance management?"

Capacity Building

District health facility and management staff reported that the competencies and skills they have gained from the previous training and orientation with NGO implementing partners enabled them to perform Liga Inan activities and provide limited technical assistance and training for new health staff or refresher training when needed. However, health staff turnover and lack of training experience by both district and national MoH staff were commonly reported challenges. In addition, political changes after the 2017 and 2018 elections resulted in change of MoH senior leadership who may not have the same level of understanding of, and commitment to, the Liga Inan program. A HAI respondent explained:

"The changes in the government sector make the handover process a little bit difficult because if I work with you on the Liga Inan program for two years, then you would understand the program. But then, suddenly, a new person comes. I have to start all over again from the beginning. I feel it is difficult to make sure that everyone is on the same page about the program."

In those situations, additional time is necessary for briefing and developing trust.

Most key stakeholders also expressed concern over midwife turnover and their limited capacity to conduct Liga Inan training. In some districts, outgoing health facility staff are expected to orient new staff about the Liga Inan. However, the knowledge and skills transfer are often not complete. A midwife from Aileu District reported:

"We provide new doctors and midwives training, but with only a few experiences, our capacity isn't enough. This program would be better if the Catalpa and HAI can come to train new doctors and midwives."

The Health Program Manager from Catalpa similarly reported:

"The orientation given by outgoing staff to a new staff member is often not to the entire program. It is often just registration and maybe it doesn't include sending broadcast messages or birth confirmation."

To address this problem, district management staff can play an important role in reinforcing the training. As the DPHO from Liquica District explained:

"If colleagues at health posts couldn't deliver the (Liga Inan) training for new health staff, I'd call them here or I'd go to the field directly to train them. Every trimester, we always invite them to come for M&E and training in the district office. But, not all of them come."

However, the trainings facilitated by the DPHO were often delayed because she had other work priorities as well. In the district health facilities where there is no midwife replacement, the work burden for existing health staff increases, preventing them from allocating adequate time for the Liga Inan program. A doctor from Manufahi District reported:

"In this health facility, we are responsible for two sub-district health posts, Darulete and Lukulai. We (doctor and midwife) work together on Liga Inan. Now, my problem is that the midwife is still sick and plans to move. I must be responsible for this program because no one else is here. More work!"

Problems with MoH staff turnover and current approaches to maintaining trained Liga Inan staff pose the risk of undermining the intention of the Liga Inan program to improve utilization of maternal and newborn health services.

Technical Assistance

Despite the program being handed over in some districts, key stakeholders from the national MoH recognized that the process of achieving full ownership of the Liga Inan program can be hindered by the Ministry's lack of technical capacity. As the MoH Director of Health Policy noted,

"We (MoH) still do not have enough capacity to fully manage the (Liga Inan) program. The IT department still needs technical assistance from the IT specialists. In terms of program management, I think there is still need for assistance as well."

Currently, to maintain the program fidelity, NGO partners continuously provide specific technical support and training for the MoH staff in the districts.

Technical support and training from Catalpa primarily focus on improving the usability of the Liga Inan platform and management efficiency of users. For example, in response to the needs of district MoH management staff, Catalpa introduced a management application that is loaded onto the Android phones of district management staff and allows them to access to Liga Inan performance statistics for

health facilities in their district. Another improvement is setting up notification system within the application. As the Director of Catalpa described:

"A person's phone buzzes if they haven't registered somebody in the past month or past few weeks. We can give them a reminder notification. Hopefully that could reduce the burden on the (Liga Inan) hotline."

Strengthening management capacity in the district level could greatly reduce the burden of central level management.

Currently, even after handover of Liga Inan in some districts, HAI continues to provide basic technical support and program performance monitoring through a dedicated Liga Inan hotline to assure smooth operation of the program. District MoH staff can call with questions or concerns or to seek technical assistance on any Liga Inan function. After the process of program handover had been initiated, HAI's on the ground and face-to-face support for monitoring and evaluation are reduced to only once per year. During these annual visits, HAI's monitoring and evaluation team work with the District Health Director and the DPHO in presenting their Liga Inan performance statistics and facilitating reflection sessions, allowing local health staff to identify good practices, challenges and find solutions together. HAI also continues to be responsible for phone maintenance and replacement.

Discussion and Recommendations

This evaluation assessed the current progress of integration of the Liga Inan mHealth program into the national health system in districts where management has been handed over to the MoH. This evaluation was limited to the context of this mHealth program in Timor-Leste, but it is likely that as other LMICs seek to integrate mHealth into the public health sector, similar facilitators and challenges will be encountered.

Comparing pre- and post-handover data, numbers of pregnant women enrolled are relatively steady with only small declines. There are substantial declines, however, in the numbers of broadcast messaging sent by health facility staff in all three districts. The fact that enrollment numbers stayed relatively steady may indicate that registering women into the Liga Inan program at the first antenatal care visit is recognized by health providers as a key component of an antenatal care visit. Past research on the Liga Ina program indicates that health staff feel very positive about the program as it helps them to increase the number of facility deliveries and meet MoH targets.[21] There are likely several factors leading to the declines noted in health staff sending out broadcast text messages. For example, health facility staff turnover, health staff with insufficient training to perform the broadcast function, or lack of motivation or capacity to compose a broadcast text could contribute to this decline. Sending broadcast messages also requires more time and effort from doctors and midwives than the simpler process of enrolling women in the program. It is notable that a smaller decline in broadcast message utilization was observed in Manufahi District, perhaps because as the pilot district, health facility staff in Manufahi received extended on the ground support from the NGO partners compared to other districts. These results suggest that the fidelity of Liga Inan program is relatively well maintained after the first stage of transition to MoH ownership of the program, achieving a full handover from NGOs to the MoH could be a plausible outcome.

Facilitating factors

Transferring the full ownership of a pilot effort to a national-scale program requires effective partnerships between key stakeholders that are based on a shared vision and purpose. The Liga Inan program is grounded in this principle because it aligns with strategic plans of the MoH and donor partners. Seeking optimal utilization of the mHealth platform and solutions for sustainable implementation are primary interests for all stakeholder groups. Community partnership is part of the program design. Involving community leaders in program promotion creates better buy-in from women in the districts, which is likely a contributing factor to high program enrollments. Such situation would likely influence the MoH to take on the Liga Inan program. Maintaining a collaborative public-private partnership has also been important because the financial support for text messages and phone credit provided by two mobile network operators has been offsetting the costs of services, reducing the ongoing program expenses.

The strong ownership by the MoH of the Liga Inan program facilitates the process of handover. At the national level, the MoH conducted their own independent evaluation to gauge the value of the program. Based on positive results, senior leadership demonstrated their commitment to the program by incorporating Liga Inan into the national health strategy, creating a supportive policy environment for program scale-up and financing, and encouraging cooperation with NGO partners and donors for a full handover. At the district level, motivated management staff who were trained in Liga Inan are taking over the responsibilities of specific management activities with assistance from NGO staff. Health facility staff have incorporated Liga Inan enrollment into the first antenatal care visit for pregnant women.

Technical expertise of NGO partners supports the process of management handover. HAI provides remote technical support and performance monitoring through a dedicated Liga Inan hotline. The organization further builds the capacity of the district MoH staff in management through annual monitoring and evaluation visits. Catalpa International has introduced application and technical upgrades on the Liga Inan platform to improve the usability and management efficiency for users.

Limiting factors

Several issues at the national level could limit the process of handover. Unlike its NGO counterparts, the MoH is a governmental structure and thus is affected by political transitions, which have recently resulted in changes of its senior leadership. New leaders may not have the same level of understanding or support for the Liga Inan program as their predecessors. Consequently, additional time is required for briefing and developing trusting relationship. The MoH also collaborates with many other organizations on health programs in the country. Given their limited time and competitive priorities, expecting the MoH to fully adopt a fast-paced, national program timeline for full handover may be challenging.

Establishing a Liga Inan management team within the MoH at the national level will involve a consortium of departments, and there are differing opinions in these departments regarding where the management of Liga Inan should be primarily based. Planning and decision-making processes will require interdepartmental collaboration, patience and flexibility, as each department has its own priorities and interests. Currently, there is a lack of management activities and technical support provided to district health staff from the national MoH following Liga Inan management handover. It is unclear if the national MoH staff consider it their responsibility to perform these management activities, or if their view is it continues to be the purview of the NGO partners.

Midwife turnover at the district level is also an important limiting factor. When staff who have been trained in Liga Inan leave, new personnel require training on how to enroll women into the program and interface with the Liga Inan service platform. Currently, the MoH has inadequate Liga Inan training capacity, so training continues to be largely managed by the NGO partners. Sustainability of the Liga Inan program will be threatened unless adequate training capacity is institutionalized. If not properly addressed, these issues could create continued reliance on NGO partners, delaying the full handover process.

The two highest ongoing program costs are Android phone repair or replacement and the provision of phone credit to health staff. NGO partners continue to provide essential services for phone repair and replacement and support the majority of monthly phone credit provision. This aspect of the program poses a major challenge for sustainability of the Liga Inan program, given the level of monitoring and funding it requires.

Although some management and a small portion of financing have been transitioned to the MoH, the majority of management activities and financing in districts that have undergone the initial "handover" are still supported by the NGO partners and the donor. Each of the NGO partners serves a unique role in the transition of Liga Inan to the MoH. However, communication between the NGOs and with the MoH is often fragmented and uncoordinated. Moreover, there is the lack of a clear transition plan prepared by the NGO partners in collaboration with the MoH that outlines a path forward to full handover of Liga Inan to the MoH. A transition plan that transparently outlines annual program costs, IT requirements, specific management activities required and associated human resources needed, and a clear timeline to achieve full handover is badly needed.

Recommendations

Within the national MoH leadership, political transitions can be unpredictable. However, interdepartmental collaboration with well-established coordination and responsibility mechanisms can help to mitigate leadership changes. It is recommended the national MoH develop an oversight structure with responsibility of ongoing monitoring and management of Liga Inan. This may initially involve creating a working group for that process that includes the NGO partner and the donor.

It is recommended that NGO partners collectively reach a mutual understanding of program sustainability and in collaboration with the MoH develop a joint transition plan that clearly proposes a full handover. The transition plan should include the annual budget required to maintain Liga inan, and required human resources for program management, monitoring, and training, and their respective suggested duties and a transition timeline. It would be beneficial for NGO and donor partners to adapt to the differing operational environments between NGOs and the MoH by adopting a long-term, flexible approach to transferring full ownership of Liga Inan. Adding risk assessment and appropriate mitigation approaches in their transition plan could ensure better outcomes of the handover process.

Between NGO partners, transparency in communication is the cornerstone of an effective partnership. It is recommended that NGO partners update each other regularly through routine meetings and create methods for monitoring and evaluating the partnership as it evolves.

Lastly, many respondents expressed that time and resources required for full handover of Liga Inan to the MoH may be substantial. There has to date been considerable investment over the past nearly six years by donors for the Liga Inan program. It is recommended that donor partners continue to financially support the transition plan in order to assure a robust and a successful handover of Liga Inan

to the MoH. As that process continues in additional districts, careful monitoring and evaluation of program integration will be necessary in order to address the many challenges involved.

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