

OPTIMIZE

# Guatemala

Report

September 2013



OPTIMIZE

Immunization systems and technologies for tomorrow



This report was commissioned by Optimize: Immunization Systems and Technologies for Tomorrow, a collaboration between the World Health Organization (WHO) and PATH. The report was authored by Ana Elena Chevez from the Pan American Health Organization (PAHO) Guatemala country office, Carolina Danovaro from the PAHO regional office, and Jan Grevendonk from WHO headquarters.

Contact information:

Jan Grevendonk  
Technical Officer, WHO  
grevendonkj@who.int

PATH addresses:

Mail  
PO Box 900922  
Seattle, WA 98109 USA

Street  
2201 Westlake Avenue, Suite 200  
Seattle, WA 98121 USA

[www.path.org](http://www.path.org)

WHO address:

World Health Organization  
20 Avenue Appia  
CH 1211 Geneva 27  
Switzerland

[www.who.int](http://www.who.int)

Suggested citation

World Health Organization (WHO), PATH. *Optimize: Guatemala Report*. Seattle: PATH, WHO; 2013.

This work was funded in whole or part by a grant from the Bill & Melinda Gates Foundation. The views expressed herein are solely those of the authors and do not necessarily reflect the views of the Foundation.

Copyright © 2013 World Health Organization (WHO), Program for Appropriate Technology in Health (PATH). All rights reserved. The material in this document may be freely used for educational or noncommercial purposes, provided that the material is accompanied by an acknowledgment.

All photos: PAHO/WHO

**OPTIMIZE**

# **Guatemala**

## **Report**

September 2013

## CONTENTS

|                                                           |     |
|-----------------------------------------------------------|-----|
| Acknowledgments .....                                     | v   |
| Acronyms.....                                             | vi  |
| Executive Summary.....                                    | vii |
| 1. Introduction.....                                      | 1   |
| 1.1. About project Optimize .....                         | 1   |
| 1.2. Optimize in Guatemala.....                           | 1   |
| 1.3. Additional information and publications .....        | 2   |
| 2. Guatemala in context .....                             | 3   |
| 2.1. The health system and vaccination in Guatemala ..... | 3   |
| 2.2. Challenges and opportunities.....                    | 3   |
| 3. Objectives.....                                        | 5   |
| 3.1. General.....                                         | 5   |
| 3.2. Specific.....                                        | 5   |
| 4. Implementation Process.....                            | 6   |
| 4.1. Key events.....                                      | 6   |
| 4.2. Demonstration project .....                          | 6   |
| 4.3. Optimize's costs and contributions.....              | 7   |
| 5. Results.....                                           | 8   |
| 5.1. Achievements and future work.....                    | 8   |
| 6. Lessons Learned.....                                   | 12  |

## **ACKNOWLEDGMENTS**

The Guatemala office, the regional office of the Pan American Health Organization, and project Optimize wish to extend their thanks to personnel from the following institutions for all of the support received:

- The National Immunization Program
- The Health Information Management System Department
- The Ixil Health Area

## ACRONYMS

The following acronyms are used in this document.

|           |                                                                                                   |
|-----------|---------------------------------------------------------------------------------------------------|
| IGSS      | Guatemalan Social Security Institute [Instituto Guatemalteco de Seguridad Social]                 |
| MSPAS     | Ministry of Public Health and Social Assistance [Ministerio de Salud Pública y Asistencia Social] |
| PAHO      | Pan American Health Organization                                                                  |
| PATH      | Program for Appropriate Technology in Health                                                      |
| PEC       | Coverage Extension Program [Programa de Extensión de Cobertura]                                   |
| SMS       | short-message service                                                                             |
| SIGSA     | Health Information Management System of Guatemala [Sistema de información Gerencial de Salud]     |
| SIGSA Web | SIGSA online system                                                                               |
| WHO       | World Health Organization                                                                         |

## **EXECUTIVE SUMMARY**

This report presents the results and lessons learned in a collaborative effort between the Guatemala Ministry of Public Health and Social Assistance (MSPAS), the Pan American Health Organization, and project Optimize. The primary MSPAS departments involved were the National Immunization Program and the Health Information Management System (SIGSA).

The demonstration project attempted to respond to the challenge of introducing new vaccines in Guatemala by implementing an information system for managing individual vaccination records and logistics. For this purpose, two integrated modules were created in the health information system “SIGSA Web.”

This information system was initially implemented as a demonstration project in the Ixil Health Area before being scaled up to the rest of the country. However, the success of this implementation was not complete. Although the individual records system and other modules worked well, several operational obstacles occurred that prevented them from optimal implementation. At the end of 2012, the new government was assessing alternatives to SIGSA Web, which places its future as a unified health system in Guatemala in doubt. Nonetheless, the logistical system was accepted as a model and platform for management of all other medications and health products.

Accomplishments were made in regard to each of the proposed objectives, while future work remains. The demonstration project also generated lessons learned that may help guide future initiatives.

# 1. INTRODUCTION

## 1.1. About project Optimize

Project Optimize, a five-year partnership between the World Health Organization (WHO) and PATH, was established to identify ways in which supply chains can be optimized to meet the demands of an increasingly large and costly portfolio of vaccines.

Optimize worked directly with national governments and other institutions to identify problems in the supply chain and test innovative solutions. We also worked with vaccine manufacturers and policymakers to help ensure that new products and policies enable supply chain systems to function effectively. The goal was to help define an ideal vaccine supply chain that can be used to develop stronger, more adaptable, and more efficient logistics systems, extending the reach of lifesaving health technologies to people around the world.

For more information, please visit these Optimize websites:

PATH: [www.path.org/projects/project-optimize](http://www.path.org/projects/project-optimize)

WHO: [www.who.int/immunization\\_delivery/optimize](http://www.who.int/immunization_delivery/optimize)

## 1.2. Optimize in Guatemala

Together with the Pan American Health Organization (PAHO), Optimize selected immunization information systems as a priority technology for strengthening vaccination systems in the region. Several studies and assessments showed that health care personnel in Guatemala experienced difficulty with the data quality on vaccinations, identifying unvaccinated or partially vaccinated children, and guaranteeing and monitoring adequate and timely supply of vaccines and supplies (See Section 2. Guatemala in Context). For these reasons, improving information systems in Guatemala became a priority for both the Ministry of Public Health and Social Assistance (MSPAS) and PAHO.

In order to respond to this challenge, in 2009 MSPAS took the initiative to computerize the individual patient and encounter records of the Health Information Management System (SIGSA) department in an integrated online system, “SIGSA Web.” This system became a working tool that MSPAS and the Ministry of Finance use for outcome monitoring in the context of the “financing for outcomes strategy.” For example, the introduction of a vaccine against pneumococcus and broadening the capacity of the cold chain will be closely monitored and assessed using SIGSA Web.

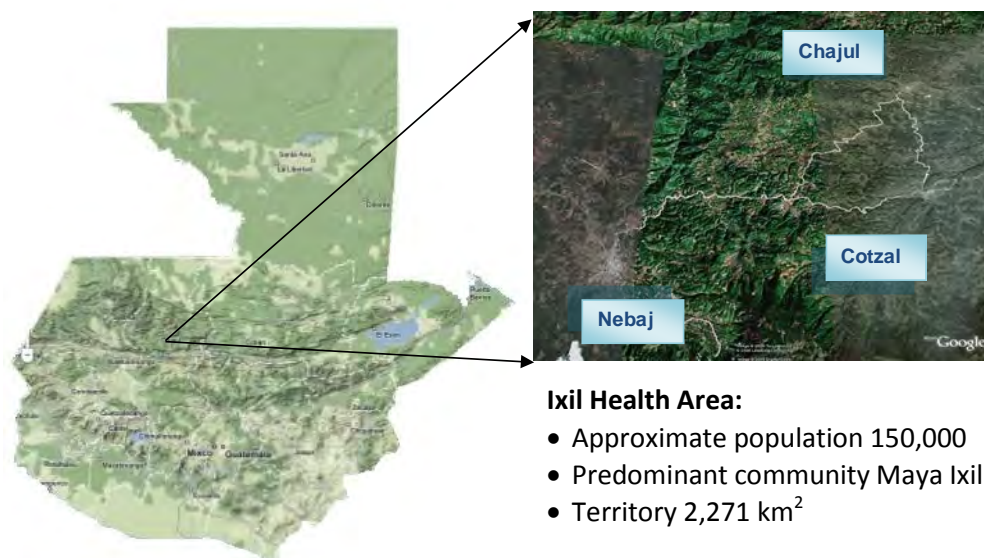
Project Optimize decided to join this already in-progress initiative by specifically supporting efforts in the following areas:

- Individual vaccination records.
- Handling of vaccines and the cold chain.
- Planning capacity of the SIGSA department.

Together with MSPAS, a decision was made to test the functionality of these systems in a demonstration area before implementing them in the rest of the country. The Ixil Health Area (see Figure 1) was chosen for this purpose because of the high degree of commitment of personnel there and its status as an underserved community.





**Figure 1. Map of Guatemala and the Ixil Health Area**



### 1.3. Additional information and publications

In addition to this report, Table 1 contains key resources that are related to the work done in Guatemala.

**Table 1. Key resources providing information related to the work done in Guatemala**

| Type     | Title                                              | Description                                                                                                                                                             | Reference                                                                                                                                                                                                                                                                                                                                                                                 |
|----------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Document | A Case for Better Immunization Information Systems | Discusses the rationale for improving immunization information systems and describes user experiences with different types of systems.                                  | <br><a href="http://www.path.org/publications/detail.php?i=2337">http://www.path.org/publications/detail.php?i=2337</a><br>or<br><a href="http://www.who.int/immunization_delivery/optimize/resources/en/index5.html">http://www.who.int/immunization_delivery/optimize/resources/en/index5.html</a> |
| Video    | Mi nombre, mi futuro (My Name, My Future)          | This PAHO video, illustrates the working context and benefits of the information system for health workers and the population served by following a mother and her son. | <br><a href="http://youtu.be/BoHIXMJ7GZU">http://youtu.be/BoHIXMJ7GZU</a>                                                                                                                                                                                                                            |

## 2. GUATEMALA IN CONTEXT

### 2.1. The health system and vaccination in Guatemala

Vaccination in Guatemala, like other public health services, is ensured by three distinct service networks:

- The MSPAS service network is organized into areas and districts. Each district generally has one health center and several health outposts.
- The Coverage Extension Program (PEC) is part of MSPAS and focuses on outlying settlements in areas that are difficult to access. Provision of health services is ensured at so-called “convergence centers” by institutional facilitators from nongovernmental organizations. Generally, the institutional facilitators visit each of their convergence centers once a month. The communities also have community facilitators.
- The service network of the Guatemalan Social Security Institute (IGSS).

Vaccines are purchased through the PAHO Revolving Fund and are received and initially stored by the National Center for Biologicals in Guatemala City. From there they are distributed using a cold chain to the centers and health outposts in the various areas and districts. The PEC institutional facilitators generally receive their vaccines from the districts, and they also report vaccinations in those locations.

### 2.2. Challenges and opportunities

Guatemala has achieved vaccine coverage rates from 92% to 94% with the various vaccines available. In spite of efforts to increase the coverage, health personnel are faced with difficulties in:

- Specifically identifying unvaccinated or partially vaccinated children, and guaranteeing and monitoring access to vaccination services for each community and each child.
- Monitoring adequate and timely provision of vaccines and supplies with the increasing cost of vaccines and the need to ensure that vaccines get to their destination efficiently and in good condition becomes more urgent.
- Guaranteeing the quality of vaccination data within a context of high internal migration and institutional complexity in a country where vaccinations are provided through various institutions.



These difficulties were documented and verified by three independent operational studies:

1. A vaccination-data quality assessment<sup>1</sup> carried out in 2008. The assessment revealed several problems with data quality and the system that produces them.
2. An assessment of user satisfaction with the immunization program,<sup>2</sup> which clearly showed that the lack of vaccines was a significant factor in lost opportunities for vaccination.
3. A baseline assessment of the immunization program in vulnerable municipalities.<sup>3</sup>

Project Optimize prepared two additional analyses:

1. The baseline assessment for project Optimize in Ixil focused on the use of the vaccination record, vaccine handling, and the cold chain.<sup>4</sup>
2. A SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis by the SIGSA Department.<sup>5</sup> The analysis concluded that the SIGSA department was generally well positioned to face the challenges of implementing the new system, though it did identify some technical weaknesses and identified the lack of continuity as a significant risk factor.

---

<sup>1</sup> Guatemala Ministry of Health, Pan American Health Organization (PAHO), World Health Organization (WHO). *Data Quality Study*. Guatemala: Guatemala Ministry of Health; 2008.

<sup>2</sup> PAHO, WHO. *User Satisfaction Study*. Guatemala: PATH, WHO; 2011.

<sup>3</sup> PAHO, WHO, Canadian International Development Agency. *Baseline in Vulnerable Municipalities*. Canada: PAHO, WHO; 2011.

<sup>4</sup> Farfán J. *Ixil Baseline*. Geneva: WHO; 2009.

<sup>5</sup> Instituto de Ciencias Sostenidas. *Summary of SSI's Activities and Products for Technical Support for the Optimize Project*. Instituto de Ciencias Sostenidas; 2011.

### **3. OBJECTIVES**

The collaboration was agreed to between project Optimize, PAHO, and MSPAS in January of 2010. General and specific objectives were defined at that time.

#### **3.1. General**

Respond to the challenge of introducing new vaccines (rotavirus, pneumococcus, human papillomavirus) by developing a system that allows for computerization of the vaccine registry and supply chain optimization in a demonstrative area (Ixil). This may allow a working framework to be defined for future expansion to the entire country.

#### **3.2. Specific**

1. Demonstrate improvement in data quality.
2. Determine more efficient management of the provision of vaccines and supplies.
3. Establish an information technology platform that can benefit the wider health system.
4. Determine the system's cost/benefit ratio.
5. Implement new technologies to strengthen logistics and storage in the vaccine cold chain.
6. Define a working framework for future expansion to the country as a whole.

## 4. IMPLEMENTATION PROCESS

### 4.1. Key events

Table 2 shows some of the key events in the implementation of the demonstration project.

**Table 2. Key events in the demonstration project's implementation**

| Year | Month               | Event                                                                                                                                                           |
|------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2009 | January             | The demonstration project is proposed to the MSPAS in a joint PAHO/WHO mission.                                                                                 |
| 2009 | January to December | Based on initial conversations, SIGSA moves forward with its own resources and develops the SIGSA Web platform, including a vaccination register.               |
| 2010 | January             | The collaboration proposal is finalized and approved by MSPAS, PAHO, and project Optimize.                                                                      |
| 2010 | August              | A workshop is organized with participation of the most important parties interested in the project to define a vision for the project and to assess user needs. |
| 2010 | August to October   | Consulting is done by the Sustainable Sciences Institute to strengthen the SIGSA unit (planning, organization, technical abilities).                            |
| 2011 | August              | An independent engineer was contracted to improve individual registration, program the logistical module, and develop the SMS module.                           |
| 2011 | September           | Elections and change of government.                                                                                                                             |
| 2012 | November            | A joint mission by PAHO/WHO and PATH is undertaken to assess the project and document its impact.                                                               |
| 2012 | December            | The logistics module is implemented in the Ixil Health Area.                                                                                                    |

Abbreviations: MSPAS = Ministry of Public Health and Social Assistance; PAHO = Pan American Health Organization; SIGSA = Health Information Management System of Guatemala; SMS = short-message service; WHO = World Health Organization;

### 4.2. Demonstration project

Optimize's activities in Guatemala were aligned with the broader framework of the SIGSA Web project, focusing on the development of two sub-modules:

1. An individual registration module for vaccinated children.
2. A logistics and inventory module for vaccines and supplies.

These modules were developed, implemented, and supported by SIGSA personnel, with specific support by Optimize in the areas of documenting processes and requirements, technical training, recruiting an outside technical consultant, and recruiting a group of experts in information system strategy.

After some initial challenges, both modules were developed in a way that was generally satisfactory to system users. However, large operational problems appeared when implementing individual registration on the ground. The primary causes of these problems appeared to be the lack of connectivity at the operational level and the use of data entry personnel at the district level to enter enormous quantities of information based on the primary records. The problems with this strategy were:

- Creation of bottlenecks at the time of data entry.
- Logistical problems sending primary records and the resulting lack of access to those registries for a specific period of time.

Not finding a satisfactory way to collect primary data created resistance among users and those responsible at various levels. After the change in government in 2011, the project lost its high-level support, and the future of SIGSA Web in general was in doubt at the time this report was written. The proposal supported by the new political team was the creation of a single health record (integrated system) with the idea of collecting information from the single record by cell phone.

On the other hand, the logistical module was accepted as a general platform for the management of all health products in Guatemala.

### **4.3. Optimize's costs and contributions**

The technical and financial contributions of project Optimize included:

- Training human resources in systems development and database administration technologies.
- Strengthening technical capacity for statistical analysis.
- Identifying gaps and defining processes (“We had an idea of what we wanted to do, but Optimize helped us define how to do it.” Albina Guerra. SIGSA technician).
- Defining standards for the development of systems based on the needs of the immunization program.
- Analyzing and designing systems for information collection from the individual record and the vaccine logistics and inventory module.
- Strengthening systems at the local level of the demonstration area (computer equipment, power inverters, human resources).
- Strengthening the central SIGSA unit with infrastructure and equipment to support the national database for individual registry of vaccinated children.
- Equipping the central SIGSA unit for the establishment of the National Center for Individual Registry Processing.
- Equipping the immunization program to strengthen analysis of the individual registry and vaccine inventory.
- Financing ongoing monitoring of the process in the pilot area.

Optimize contributed US\$250,000 in financial support, which complemented a many times greater investment by MSPAS.

## 5. RESULTS

### 5.1. Achievements and future work

#### Objective 1: Demonstrate data quality improvement.



An individual vaccination registry has been established that may serve as a basis for ensuring data quality in the medium term. This implies a profound change from a manual system that did not allow for easy identification of unvaccinated children.

This change has already been useful. For example, MSPAS' financial controller accepted information from SIGSA Web as a

basis for monitoring implementation of the vaccine budget for their outcome-based management strategy.

However, it has not been possible to demonstrate data improvement when compared to the earlier paper-based system. Vaccination coverage for 2011 was reported from the new SIGSA Web system. As this showed a slight decrease when compared to coverage in 2010, it will be necessary to make sure that the data reflect what really happened and was not affected by data management problems.

Future work that could be done in this area includes:

1. *Assessing and monitoring data quality of the individual registry.* Unfortunately, the paper-based system is no longer in use; its existence would have allowed rigorous comparison of the two data sources. Nonetheless, there are other ways to ensure the data quality in the SIGSA database. These include a search of duplicate records (see below), a systematic comparison between the database and paper registers, and a comparison of coverage according to SIGSA and coverage surveys.
2. *Searching for mechanisms to prevent, detect, and manage duplicate records.* The assessment revealed that data entry personnel entered some children into the system several times. This is explained in part by the fact that data were not entered by personnel from the health posts and centers. Health post/center staff knows their population best and could have more easily detected and avoided these problems. Nonetheless, improvements that can be implemented include:
  - Developing lists or screens to help detect duplicate fields (based on replication of names, birth dates, places of birth, or other data fields).
  - Making it possible to combine two files or deactivate one of them.
  - Creating a better search for mechanisms and unique identifiers, for example using the unique personal identity number of the mother instead of relying only on the child's number.

3. *Searching for ways to separate coverage and “vaccination.”*

Currently, vaccination data are gathered using immunization registers (physical records that record the children from a health outpost or center by cohort). Children that are registered in one health center may have been vaccinated in another and may be reported twice. This can only occur if duplication exists in an individualized system or if one of the reporting entities is outside the system (IGSS, the PEC, or in an area still unconnected to the system). The first improvement that could be implemented is inclusion of a field on the vaccination record that reports where the vaccination was administered.



4. *Making the data entry process more flexible.* Currently vaccination data are entered by data entry personnel from the districts using health facility paper registers. This process is not only very disruptive for health personnel, who must carry their registers and then look for them again days later, it is also more labor intensive and creates more errors. The immunization registers (organized by birth date) are inconvenient for data entry of vaccinations from the previous week or month. Alternative solutions include:

- Using a daily registry or consultation registry in which vaccination is recorded as a consultation and each line corresponds to only one vaccination, organized by date of vaccination.
- Using a list of children awaiting vaccination at the health outpost or center in a given month, which would be printed at the district level and distributed systematically. This list would be useful to help health personnel identify the children in need of vaccination that month and can be used to report the vaccinations.

5. *Providing more detailed analysis and standardization of data flows from IGSS and the PEC.*



**Objective 2. Demonstrate more efficient management in provision of vaccines and supplies.**



A logistics module has been developed for the management of vaccine and supply stocks that adapts well to the system used in the country (called BRES). This module also includes an integrated inventory of the cold chain.

The module was implemented in the National Center for Biologicals, but the process in the Ixil Health Area was not complete at the time of this writing. Therefore, its impact on cold chain stock management cannot yet be demonstrated.

Future work that could be done in this area includes:

1. Detailed testing of the module and adaptation of the system and processes for data collection and follow-up of requisitions when necessary. Special attention needs to be paid to the practicality of registering administered doses and wasted doses from the district.

**Objective 3. Establish an information technology platform that can benefit the wider health system.**



The knowledge and experience acquired by the SIGSA team through project Optimize strengthened the information systems of other MSPAS programs including tuberculosis, sexually transmitted diseases, HIV/AIDS, chagas, water and sanitation, the National System for Food and Nutrition Security, the module for disasters, and the logistical model for medications in the health areas.

Additionally, MSPAS understood the importance of an individual registry for health information beyond monitoring aggregate data.

In recent years, MSPAS and SIGSA have made great progress in the construction of a technological platform. Nonetheless, two agenda items that remain pending regarding the organization and structure include:

1. Defining a health information policy that includes preparation of a legal framework and establishing data standards, confidentiality protocols, and data security.
2. Establishing a multiyear plan and assigned budget, roles, and responsibilities for all the actors involved. This plan must provide stability of resources and responsibilities necessary for construction and maintenance of information management capacity, while also being sufficiently flexible to be adapted to the changing priorities of MSPAS.

**Objective 4. Determine the system's cost/benefit ratio.**

Whether system benefits justify their costs has not been established. This is primarily because as of today the system has not been completely consolidated, and the benefits are being questioned by parts of MSPAS.

**Objective 5. Implement new technologies to strengthen logistics and storage in the vaccine cold chain.**

A platform has been developed for the automatic sending of SMS text messages. However, experimentation is still being carried out with content, recipients, etc., and the impact of using the new technologies remains to be documented.

**Objective 6. Define a working framework for future expansion to the country as a whole.**

With the exception of the logistics module, for which integration into the broader system has been ensured, the future scale-up of the system is currently in doubt. In addition, the lessons learned during project Optimize may serve to guide future initiatives.

## 6. LESSONS LEARNED

The following seven lessons learned may assist future projects in Guatemala and other countries:

1. The importance of taking into account people, existing processes, and the local context rather than focusing only on the software. Careful planning of operational implementation and properly matching the information system to the realities and context of the country is necessary for success. For Guatemala, the paper-based system for data collection, with data entry done at a higher echelon, was its Achilles' heel. The creation of more flexible formats or the use of electronic devices (telephones or computers) at the local level should be considered.
2. The need for detailed situational analyses for development of a multi-annual work plan with clear goals and progress indicators, defined budgets, and roles and responsibilities. Lessons learned from various experiences should also be taken into account. In addition, a routing sheet should be created for development and support of the health information system.
3. The importance of continuity for strategic processes that is brought about by stable human resources.
4. The need to validate the functioning of systems, optimization of processes, and the quality of data produced for a new system before expanding its use.
5. Adequate planning and monitoring of the data transfer process between one system and another.
6. MSPAS, with technical assistance from its partners, should look for mechanisms to strengthen its technical capacity in key areas related to the information system.
7. Sending of electronic messages is possible with the MSPAS' SIGSA platform, and the use of SMS is well regarded, while health personnel are easily motivated to use this type of tool to communicate with their populations.