

**5-YEAR ASSESSMENT OF THE PROJECT TO SUPPORT PAV
CABO DELGADO PROVINCE**

VillageReach ▪ FDC ▪ MISAU

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1. Introduction

In February 2001, the Foundation for Community Development (FDC) and VillageReach launched an initiative, which resulted in the signing of a memorandum of understanding with the Government of Mozambique, through the Mozambique Ministry of Health (MISAU), to ensure the provision and the prompt and universal access to vaccines and other medical supplies in Mozambique.

In March 2002, a 5- year pilot project was initiated – from April 2002 to March 2007. In the project, the FDC and VillageReach, in coordination with MISAU, through the Expanded Program on Immunization (PAV) and the Provincial Directorate of Health (DPS) of Cabo Delgado. Through this partnership the project distributed vaccines, gas, medicines and other essential medical supplies to all the health facilities, including rural health facilities, which were often isolated from the normal distribution systems due to the insufficient public infra-structure.

This report documents the project history, system, and objectives. It also assesses the activities of the project in Cabo Delgado by examining: (i) what was planned; (ii) what was successfully accomplished; (iii) what was not carried out or completed; and (v) what the budget was to carry out the activities. This assessment of activities does not intend to substitute the impact evaluation of the project, which is expected to be complete in October 2008, but aims provide stakeholders about whether the project attained its objectives or, if it did not, to determine what the difficulties faced were, and the corrective actions that should be implemented in project expansions to ensure its efficacy.

2. History of the Project to Support PAV

In February 2001 VillageReach and FDC approached MISAU and initiated a yearlong study that included a review of public health systems in Mozambique, other African countries, Europe and the USA. Based on the study, VillageReach and FDC found that a focus on transport, logistics, stock management, and strengthening the cold chain would be an appropriate set of interventions to solve some problems of getting vaccines to the people of northern Mozambique. In March 2002, VillageReach, FDC, and MISAU signed a contract for a five year health infrastructure project in Cabo Delgado. The following month, VidaGas was founded.

To start the project in Cabo Delgado, the Project was implemented in phases, first targeting a small cluster of health facilities. This small initial target allowed the project activities to be clearly defined, implemented, and refined before rolling out to the rest of the province. The project initially focused on the cold chain and supplied the health facilities and provincial deposito with gas refrigerators. Gas refrigerators were used because they were found to be more reliable, easier to maintain, and propane is a clean-burning energy source. After supplying the

health facilities with gas refrigerators, the health workers and DPS maintenance team were trained on their use and maintenance. The gas refrigerators were strategically implemented, and not all health facilities received refrigerators. The project worked with DPS and other partners to only replace the refrigerators that needed to be replaced. Well-functioning solar and electric refrigerators were not replaced because they did not pose threats to the cold chain. In addition, the project developed relationships with other refrigerator donors in the province. These relationships allowed other donors to call the project if one of their refrigerators broke, and the project could replace it with a new gas refrigerator.

After the cold chain was strengthened, the transport and logistics system was refined and the project began monthly deliveries in July 2002. With the onset of monthly deliveries, the project found two major problems that had to be resolved. First, the ideal stock levels for the health facilities required adjustment. Stock needs were based on outdated population numbers (from the 1997 national census) and as the public learned about the regular and reliable supply of vaccines and supplies at health facilities, the demand for vaccines increased. To resolve this problem, the ideal stock numbers were continuously re-evaluated and a detailed analysis of the stock usage history was completed and used to inform the ideal stock levels. The second problem related to upstream supply logistics. Often, it was not possible to conduct deliveries to the health facilities, because the required stock did not arrive in time or at full levels from the national deposito. The resolution to this problem was to refine and further systematize the process of quarterly orders of vaccines.

In November 2004, two and a half years after the start of the project, the project was completely rolled out to all fixed vaccination posts in Cabo Delgado province. Also in 2004, the project implemented a systematized data system with nine key indicators to regularly monitor project activities. Throughout the project implementation time period, activities expanded to include providing equipment (gas powered lamps and burners, bicycles, motorcycles, satellite phones, and fire extinguishers), improving infrastructure (waste pits and latrines), conducting social mobilization activities, training in cold chain and vaccine freezing, and supporting DPS with vaccine campaigns.

In April 2007, the MoU for the project expired. From the initiation of the project, this expiration was anticipated and the plans were to transition the responsibility of the system to DPS. In anticipation of this transition, responsibility for the south zone of Cabo Delgado was transferred to DPS and the other two zones were fully transferred in June 2007.

2.1 Expansion Strategy

During the Cabo Delgado project period, the project expanded to neighboring Nampula province. MISAU, FDC, VillageReach, and DGIS signed an MoU in November 2005 to expand the project to Nampula. Based on the lessons learned from the demonstration project in Cabo Delgado, some modifications to the

rollout were made. First, the expansion was done on a reduced timeframe and all 163 fixed vaccination posts came online within six months. This was possible because we knew the intricacies of procurement and installation of equipment, what challenges to expect, and how the system would work.

The second change in Nampula was the staff composition. We maintained the field team structure of one field coordinator and one driver per zone, but we changed the field coordinator employer. In Cabo Delgado, the field coordinators were employees of the project and in Nampula they were DPS employees. Having field coordinators who worked for DPS was important for the long-term sustainability of the project and is anticipated to simplify the transition to DPS at the end of the five-year project period.

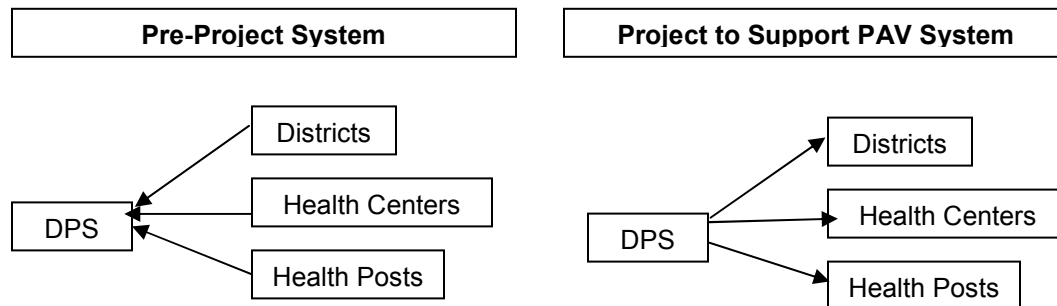
2.2 Timeline of the Project Rollout and Expansion

The table below details the expansion of the project in Cabo Delgado and Nampula provinces.

Date	Rollout Activity
July 2002	Deliveries began in the South Zone of Cabo Delgado to 34 health facilities in 5 districts
July 2003	2 more districts (Pemba Metuge & Mecufi) in the Central Zone of Cabo Delgado were added. The total health facilities served in Cabo Delgado came to 39 clinics in 7 districts.
November 2004	Rollout of Cabo Delgado was complete. The total health facilities served came to 87 in 17 districts in Cabo Delgado.
September 2005	Added 88 th clinic (Paquitequete in Pemba Cidade) that began offering PAV services. The total health facilities served in Cabo Delgado came to 88 clinics in 17 districts.
August 2006	Began deliveries in 85 clinics (in North and Central zones in 12 districts) in Nampula.
October 2006	3 more clinics online in Nampula to total 88 health facilities served in Nampula.
January 2007	Rollout of Nampula was complete. The total health facilities served came to 163 in 21 districts in Nampula.

3. The Project to Support PAV System

The Project to Support PAV changed the distribution of vaccines from a fully decentralized system to a system centralized at the provincial level. The diagram below depicts the pre-project and the project systems.



Prior to the Project to Support PAV, health facilities were individually responsible for picking up vaccines and supplies from the DPS deposito and taking them back to their health facility for use. This system caused various problems and was plagued by various problems including:

- ◆ Closing of health facilities during business hours so health workers could pick up vaccines and supplies.
- ◆ Challenges securing transport to go to the DPS deposito. Each district generally has one vehicle, which is for all health service trips by all health system personnel, and is also the ambulance in case of emergencies. When it is time for the District EPI Chief to go pick up or deliver vaccines, the vehicle may be out on an emergency, in use by someone else for some other health-system function, broken down, or out of gas.
- ◆ Difficulty maintaining proper vaccine temperatures during transport.
- ◆ Uncoordinated vaccine supply requirements.
- ◆ Frequent stockouts of vaccines in health facilities.
- ◆ Shortage of supervision visits at health facilities.
- ◆ Funds were often liberated late – both quarterly from the provincial level to the districts, and monthly from the district administrator to the EPI Chief who needs to purchase gas for the refrigerators, fuel up the district vehicle, and go pick up and distribute vaccines.
- ◆ There is sometimes a lack of planning capacity at the district level.

3.1 Advantages and Disadvantages of the Systems

The system implemented by the Project to Support PAV was designed to address many of these problems. The project created field teams based at the DPS deposito who traveled to each of the fixed vaccination posts every month to

deliver vaccines, supplies, propane, and other medicines. The **advantages of the project system** are as follows:

- ◆ Reduction in stockouts of vaccines. In July 2004, 79% of Cabo Delgado's fixed vaccination posts had a stock out of at least one type of vaccine. With the project activities, the percentage is regularly reduced to below 1%.
- ◆ Consistent delivery dates – which afford consistent supply, which contributes to fewer missed opportunities due to stock-out, greater trust in the health system, and more kids immunized.
- ◆ Reliable cold chain during transport (and in health facilities).
- ◆ Supportive supervision at health facilities during delivery visits. The project field coordinators are experienced public health personnel and perform supportive supervision activities during delivery visits. This work improves overall health facility management, stock management, vaccine conservation, injection safety, waste management, data records, and adherence to PAV policies.
- ◆ Improved knowledge for DPS PAV staff. Because the field teams are based at the DPS deposito, the knowledge that they gain about current problems at health facilities and anticipated problems at the health facilities is shared with DPS PAV staff. This allows for immediate or preventive action to resolve problems. This also allows for aggregation of issues province wide, which enables PAV to better understand trends and underlying causes of problems with PAV field operations.
- ◆ A centralized and standardized data collection entity that provides for consistent collection and reporting of monthly data. When the field coordinators visit the health facilities, they systematically record and track data regarding the quality and usage of PAV stock.
- ◆ Dedicated personnel and transport, with consistent control and maintenance of transport assets.
- ◆ Consistent monitoring and preventive maintenance of refrigerators.
- ◆ Consistent link between provincial level, districts, and clinic level.

There are some **disadvantages to the project system** as well.

- ◆ Disagreement with the MISAU policy of decentralization. Because MISAU's policy is to place responsibility on the lowest appropriate level of the system, a centralized delivery systems seems to disagree with the policy. However, there are two responses to this situation. First, certain activities are best left centralized because the benefits of centralization outweigh the benefits of decentralization. Second, the system can accommodate the benefits of decentralization. For example, one incentive for decentralization is that districts should be responsible for activities at the health center and health post level because they are most familiar with the realities in their district. In the project system, this information is shared, discussed, and analyzed at the district and provincial level. As a result knowledge of areas related

to the program (stock management, cold chain, logistics, etc.) is known not only at the district level, but it also is passed up the chain to the provincial level.

- ◆ Need for additional staff. The project system requires a staff of field coordinators and drivers in addition to existing DPS staff, which means there is additional cost.

3.2 Why Implement this System?

The Project to Support PAV implemented this system to address the numerous problems that resulted from the pre-PAV system that resulted in serious disruptions to PAV services and low vaccination coverage rates in the province. The project partners agreed that a team focused on specifically on transport, logistics, cold chain, stock management, and supportive supervision was the best way to resolve the problems. With a dedicated team in a centralized system, the responsibility, accountability, and authority was specifically assigned to individuals rather than diffused among numerous individuals who had many other activities to conduct.

An additional reason for implementing the centralized system was to create economies of scale in the transport system. The delivery vehicles that carried vaccines, syringes, safety boxes, and gas could also deliver additional medical commodities, thus reducing the need for separate transport for vertical programs. By using this delivery system for other medical commodities, the transport and delivery costs are reduced.

3.3 Making a Sustainable System

From the start of the project, the partners aimed to create a sustainable system with sustainable benefits and impact. The plan for sustainability had two components. First, the partners agreed that implementation would be done by FDC, which is a local community development NGO. By FDC serving as the project implementers, the program administration and management would be done locally and therefore, more sustainable than through an international NGO. Second, the partners agreed to transfer the system operations to DPS at the end of the project period.

4. Main activities planned

The main objective of the pilot project in Cabo Delgado implemented by FDC and VillageReach was to develop an effective and sustainable logistic system for supplying equipment, vaccines, fuel and other medical supplies to all the fixed vaccination posts in the Province.

Main activities and goals:

- ◆ Provide and maintain the cold chain equipment, replacing the petrol and poorly functioning solar refrigerators with gas refrigerators;

- ◆ Regularly and reliably distribute vaccines, gas, essential medicines and other medical supplies;
- ◆ Strengthen the capability and the mobility of the mobile brigades;
- ◆ Carry out social mobilization actions aiming to increase the vaccination coverage and quality;
- ◆ Establish a communication system for coordination and emergency response in the health facilities;
- ◆ Implement medical waste management systems and allow for safe injection;
- ◆ Monitor and supervise the logistic process;
- ◆ Strengthen the technical capabilities of the health workers involved with the EPI activities by supporting their training;
- ◆ Develop the skills of the health workers involved with the activities of the EPI;
- ◆ Strengthen the management capacity of PAV staff; and
- ◆ Strengthen the Health information system.

5. Assessment of Activities

This section describes the activities that were successfully achieved and those that were not and extracts some lessons learned from this analysis.

5.1 Supply and distribution of medicines and other medical supplies

a) **Objective:** Ensure the access to vaccines, gas and other medical supplies.

The success of the following activities completed this objective:

- (i) Regular monthly supply of 100% of the vaccines, fuel (LPG), medicines and other medical supplies to all the health facilities of the 17 Districts.

- A transportation system was established comprising 3 field teams (one for each zone). The field teams had a field coordinator, driver, vehicle, and a communication system. The teams ensured the distribution of the medical and other supplies to the 88 health fixed vaccination posts in the Province.

The equipment, vaccines, medicines, and other medical supplies delivered were:



Field Coordinator Alfredo Durão delivering vaccines.

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Vaccines and other medical supplies	Other
<ul style="list-style-type: none"> ○ Vaccines against <ul style="list-style-type: none"> ▪ - polio, ▪ - measles, ▪ - BCG, ▪ - DTPHep B, and ▪ - TT; ○ Disposable syringes ○ Essential medicines (health kits); ○ oxygen; and ○ other medical supplies 	<ul style="list-style-type: none"> ○ LPG ○ A variety of spare parts for equipment maintenance and repair

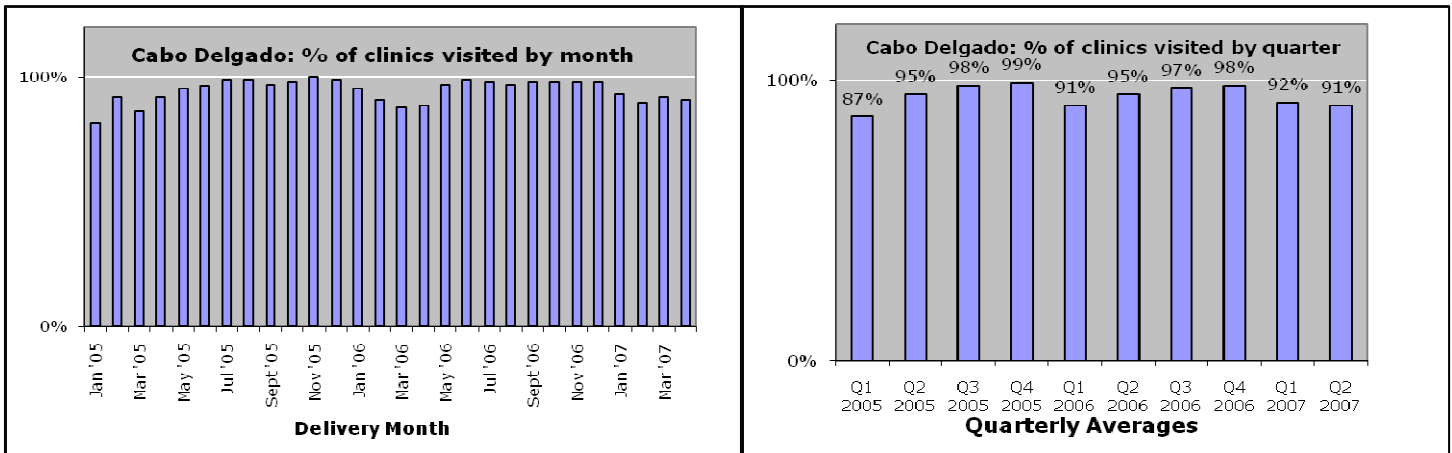
The table below totals the systematized items delivered during the project from August 2004 – April 2007.

Items Delivered August 2004 – April 2007								
Year	Vaccine Doses					Syringes		
	BCG	DPTHpB	Polio	Measles	Tetanus	0.5 ml	0.05 ml	5 ml
2004	39,000	37,640	87,800	19,580	42,630	52,793	7,769	991
2005	129,200	173,310	244,480	61,210	182,720	134,757	25,523	15,209
2006	131,260	171,330	303,730	77,130	189,230	60,073	20,570	6,684
2007	43,700	47,020	79,020	18,390	61,290	18,202	7,696	2,650
TOTAL	343,160	429,300	715,030	176,310	475,870	265,825	61,558	25,534

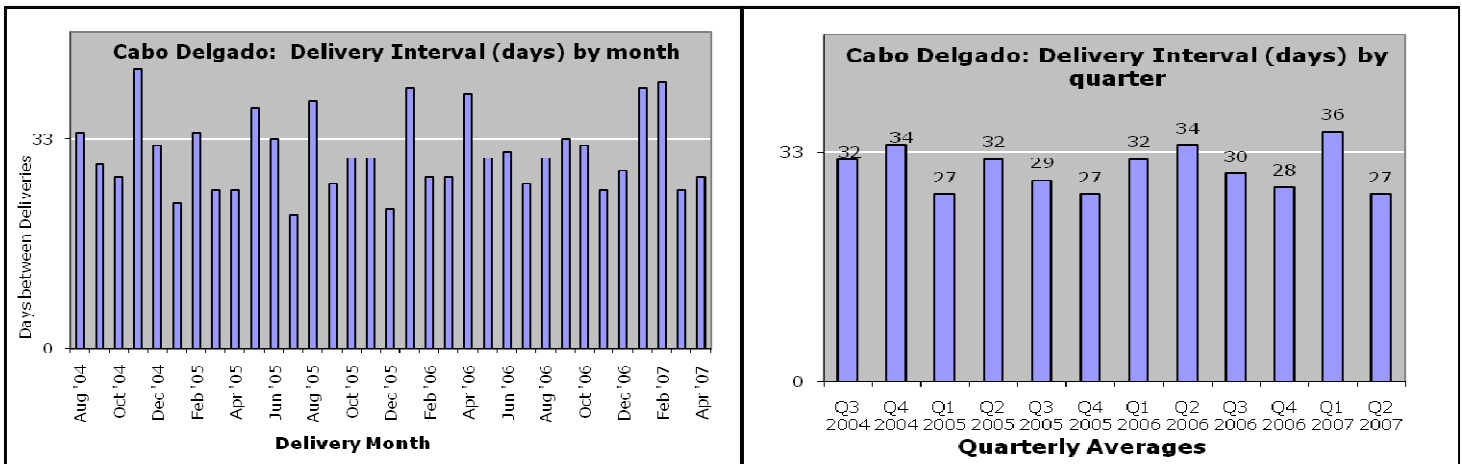
Items Delivered Continued August 2004 – April 2007			
Year	Safety Boxes	Gas	
		Cylinders	Kg
2004	906	485	2,668
2005	1,517	2,091	11,501
2006	2,105	2,286	12,573
2007	22	692	3,806
TOTAL	4,550	5,554	30,548

The field teams successfully visited all accessible clinics each month. The projected aimed to visit 100% of all fixed vaccination posts each month but a target of 90% was deemed acceptable due to road conditions that prevented access to numerous clinics on a regular basis. The graphs below show the percentage of the 88 fixed vaccination posts that were visited every month and by quarter starting in January 2005.

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The field teams also successfully completed regular deliveries to ensure a consistent and quality stock of vaccines and supplies. The teams targeted a delivery interval of less than or equal to 33 days each month. This target was maintained for most months with some exceptions due to upstream supply issues and holidays. The delivery intervals for the project by month and quarterly averages from August 2007 – April 2007 are displayed in the graphs below.



- A company was formed (VidaGas LLC), which ensures the supply of propane for powering the refrigerators, lighting and burners in 100% of the districts and their respective health facilities.

VidaGas plant in Pemba and propane accessories



- (ii) Supply, maintenance and repair of the equipment included in the plan in 100% of the districts and health facilities were achieved. In addition, other equipment was supplied to the health facilities above and beyond the project plan because they were of crucial importance to the project and health facility operation.

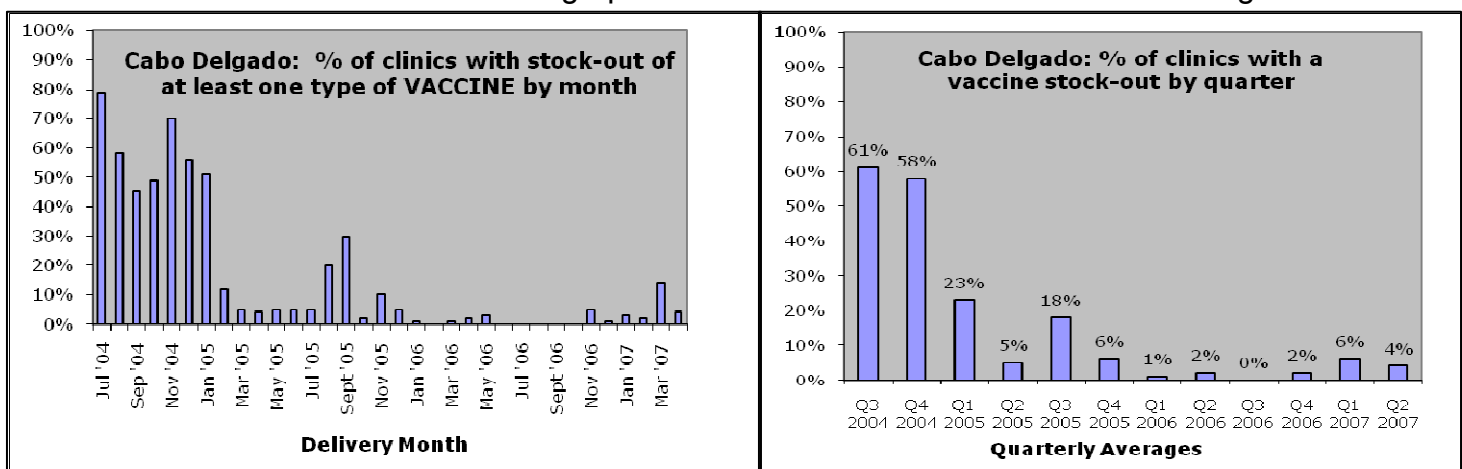
The project tracked the refrigerator problems from August 2004 – April 2007. The table below describes the refrigerator problems found and addressed during this time period.

Types of Refrigerator Problems by Refrigerator Type, July 2004-April 2007			
Type of Refrigerator	Gas	Petrol	Solar
Number of Refrigerators as of January 2007	83	All petrol refrigerators were replaced in January 2005	5
Problem	# Incidences	# Incidences	# Incidences
Burner problem	1	2	0
Gas line problem	3	0	0
Operator Error	12	0	0
Other problem	2	1	0
Other gas/solar problem	8	0	3
Ran out of gas/petrol	6	8	0
Regulator problem	14	0	0
Thermostat problem	2	0	0
Awaiting DPS Repair	0	2	13
Battery problem	0	0	6
Solar panels stolen	0	0	7
Total	48	13	29

- Gas refrigerators were placed in all health facilities except for five (Mboje, Negomano, Maganja, Mute and Namaluco). Refrigerators were not placed here either due to the lack of security (building in poor condition) or to the lack of qualified human resources.

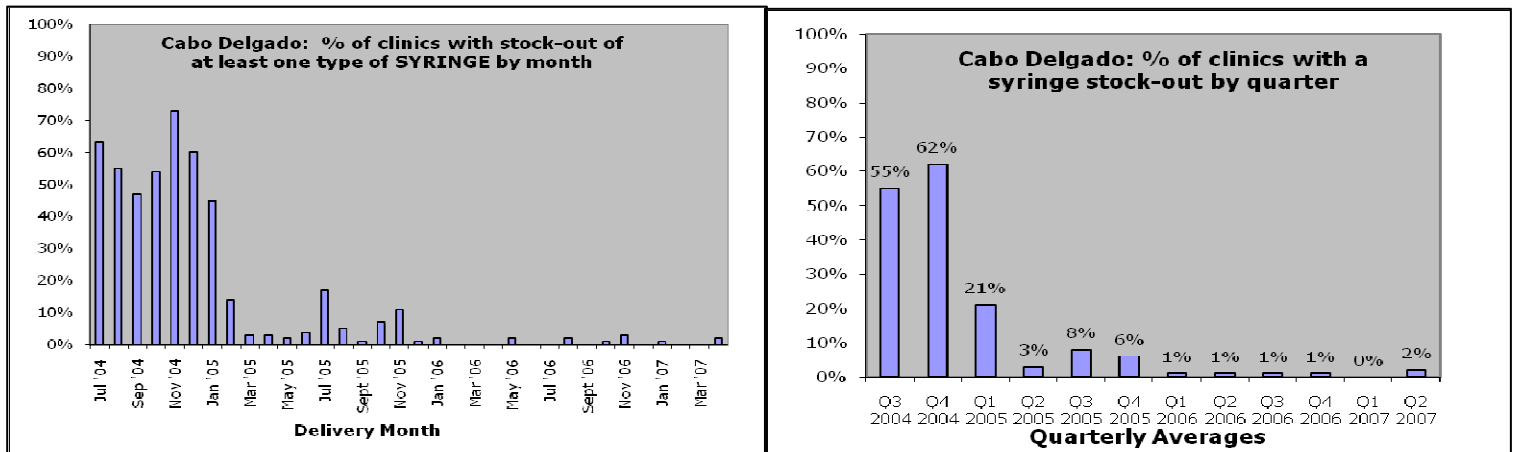
b) Outcomes

- a) Contribution to the reduction in stock outs (*ruptura de stocks*) of vaccines from 80%, in 2004, to less than 5% on a regular basis. Note that a new calculation of the ideal stock levels was done to help address the problem of stock outs. The graphs below track vaccine stock outs during the

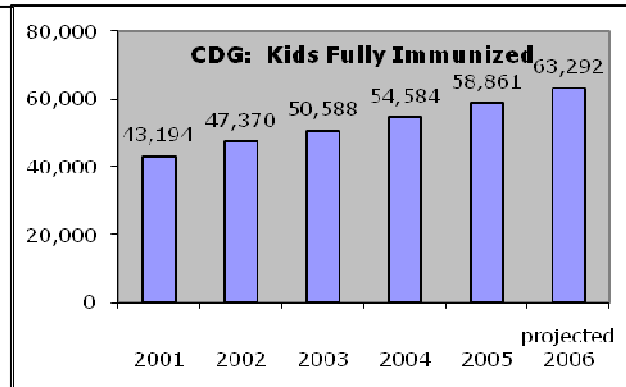
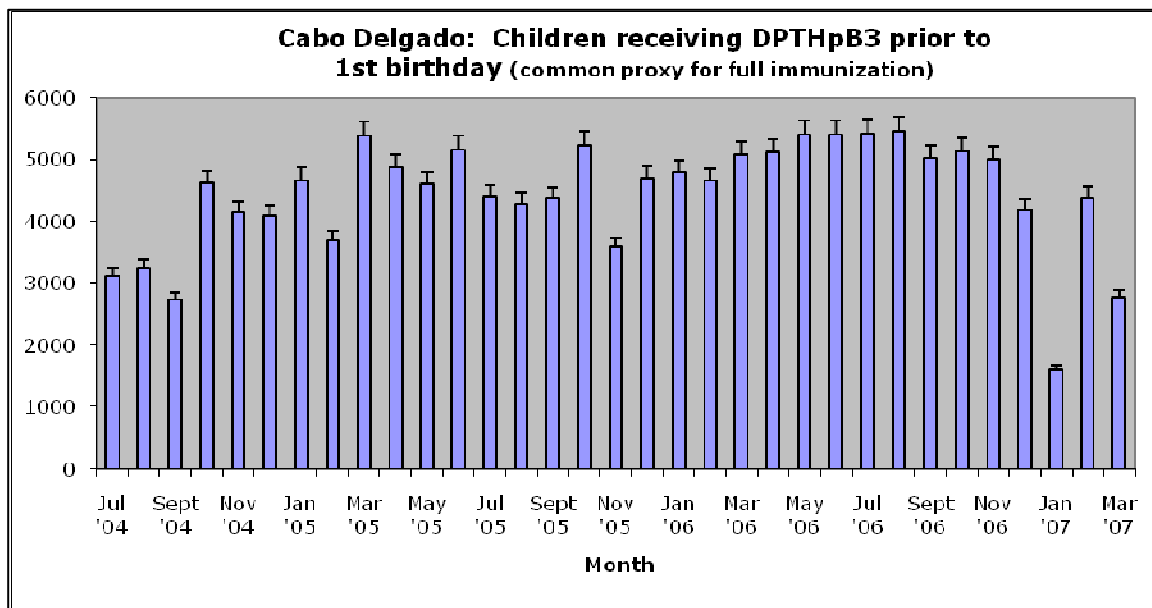


project.

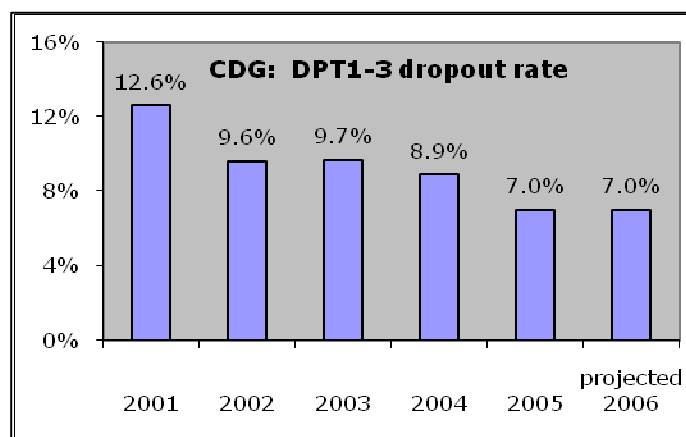
- b) Reduction of syringe stock outs from a high of 73% in 2004 to regularly below 3%. The graphs below track syringe stock outs during the project.



- c) Contribution to the increase in vaccination coverage of 40%. The graphs below track the number of children immunized through the project.



- d) Contribution to the decrease of the dropout rate (*taxa da quebra vacinal*).
From 2001 to 2006, the dropout rate decreased over 5%.



- e) Contribution to the decrease of *vaccine wastage rate* (*taxa de desperdício de vacina*) and maintaining the wastage rates well within MISAU criteria.

Open Vial Wastage Rates July 2004 - March 2007					
	BCG	DPTHpB	Polio	Measles	Tetanus
2004 Average	27%	8%	10%	21%	9%
2005 Average	30%	7%	10%	22%	7%
2006 Average	29%	6%	9%	20%	5%
2007 Average	37%	6%	9%	18%	5%
MISAU Criteria	<50%	<15%	<15%	<25%	<15%

Closed Vial Wastage Rates July 2004 - March 2007					
	BCG	DPTHpB	Polio	Measles	Tetanus
2004 Average	1.0%	0.0%	0.7%	0.3%	0.2%
2005 Average	0.9%	0.3%	1.1%	0.7%	3.1%
2006 Average	0.4%	0.1%	0.2%	0.2%	0.5%
2007 Average	1.5%	0.7%	3.0%	17.7%	0.4%
MISAU Criteria	<50%	<15%	<15%	<25%	<15%

NB: 2007 wastage rates are distorted because only three months of PAV data are included for the year due to the project completion.

- f) Appropriate handling –by 176 Health workers – of equipment operation, maintenance, and repair activities.
g) Strengthening of monitoring and supervision (through monthly delivery visits and quarterly supervision visits).
h) Better use of health workers' schedule (better handling and less equipment damage).

- i) Guaranteed vaccine conservation at ideal temperatures (+2° C to + 5° C).
- j) Improvement of the quality and reliability of the Health Information System (*sistema de informação da saúde -SIS*).

5.1 Improve infrastructure at health facilities

a) **Objective:** Supply health facilities with equipment and infrastructure to improve PAV services and community health.

The success of the following activities completed this objective:

- (i) Supply of various equipment to health facilities including:
 - Refrigerators. The project supplied 5 refrigerators for vaccine conservation at the Depósito Provincial and 83 refrigerators for vaccine conservation at the Health facilities. The project supplied gas refrigerators to replace old, unreliable petrol and solar refrigerators. By using gas as an energy source, the refrigerators also contributed to a cleaner environment at the health facilities.



Left: A petrol refrigerator before the Project to Support PAV
Right: A new gas refrigerator

- 91 gas sterilization burners



Sterilization over a fire before the project

Sterilization using a gas burner provided by the project

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- 63 lamps for maternity units and emergency care
- 3 vehicles “Land Cruiser” type (4X4 pick-up) equipped with radio



Left: Gas powered lamp provided by the project
Right: Land Cruiser

- 17 motorcycles for the DDS's
- 32 bicycles for the peripheral health facilities
- 58 satellite radios



Transport and communications provided by the project: motorcycle, bicycle, and a satellite phone.

- 90 fire extinguishers for the health facilities



A well-stocked health facility with a fire extinguisher and a propane refrigerator

- 8 latrines at health facilities that previously had no latrine. An additional 32 latrines are planned to be built in the province.



A latrine before the project

Improved latrine, including hand washing station, provided by the project

- 17 cement waste pits at district Sedes and 40 improved simple waste pits at health centers



An unsafe waste pit

Improved simple waste pits

5.3 Completion Analysis

This section analyses the activities that were complete and the activities that were not complete.

5.2.1. Mobile Brigades

a) Objective: Increase vaccination coverage.

DPS is responsible for implementing mobile brigades and VillageReach and FDC supported the mobile brigade activities as part of the project. As such, project support constituted of:

- a) Providing of bicycles and motorcycles (see the table above for details);
- b) Distributing vaccines and safety boxes; and

- c) Supporting the planning process.

The process of mobile brigades remained a weak area throughout the project for two reasons. First, mobile brigades are not systematized. There is no standard across the province or within districts for when they are conducted, their frequency, or their follow-up. The lack of standardization weakened the planning and preparation processes. The second weakness is that the records mobile brigades are still not correctly registered and systematized. When a health worker completes a mobile brigade, the vaccination data is recorded, but not always separated from the data of vaccinations done at the fixed vaccination post. This problem in recording data makes it difficult to assess the effectiveness and impact of mobile brigades, which also hurts DPS's ability to plan future mobile brigades.

5.2.2 Social Mobilization

a) Objectives: Increase the vaccine coverage and the trust in the health system, and increase the population's knowledge about the importance of the vaccination process.

Social mobilization activities were not a strong point of the process. During the first four years of the project, activities were carried out in only 6 of the 17 Districts, and consisted of:

- a) Using local theater groups to discuss issues of vaccination;
- b) Working with community leaders to do social mobilization;
- c) Implementing the “maternidade segura” (safe maternity) program in which 60 midwives were trained in 3 Districts; and
- d) Beginning the “mãe-espera” (expectant mother) project, with the construction of shelter houses in 3 Districts.

A major weakness was that the monitoring and evaluation of these activities were not systematically done. Therefore, the effectiveness and impact of the activities is unknown. The reason for this lack of monitoring and evaluation is that the project gave priority to the supply of equipment, gas; establishment of an effective logistic system of vaccine delivery; and training of human resources in the operation and maintenance of the equipment.

In the last year of the project, there was a focused social mobilization effort that aimed to get more children in Cabo Delgado fully immunized by increasing mothers' adherence to the vaccination schedule. Three strategies were used to achieve the objective and consisted of increasing mothers' understanding of the vaccination schedule and the child health card, improving the experience that mothers have at the clinic, by improving the manner in which health workers interact with mothers, and increasing societal pressure/social support for mothers

to adhere to the vaccination schedule, by engaging community members to encourage mothers to follow the schedule. With these goals and strategies, the following activities were completed:

- ◆ 2 workshops involving 40 mothers, 19 health workers, and 15 community members. A questionnaire before and after the workshop found that the community members and mothers increased the percentage of correct answers by 61%, while health workers increased by 55%. A 20% increase in doses of vaccines used was observed one month following the workshop, while over six months there was only a 0.6% increase.
- ◆ 2-day workshop at the Pemba Health Training Center (CFSP) with 10 students and 6 instructors. As a result of the workshop, a Nucleus of Social Mobilization was formed and 5 palestras were conducted.
- ◆ Radio broadcasts were done in 3 districts. Over 6 months, 48 2-minute spots, 24 1-minute spots, 8 15-minute panel discussions, and 2 1-hour panel discussions were broadcasted on the radio.

These social mobilization activities were closely monitored and evaluated, and through that process we learned that the shortage of human resources for health was a major limitation of the impact of these activities. Health workers currently in the system are overworked and encouraging them to conduct necessary social mobilization activities puts additional strain on the system. Despite this, the project did see short-term positive impact of these activities.

5.2.3. Medical Waste Management / Safe Injection

a) Objective: Protect the patients and the communities from infections caused by the use of medical instruments and waste.

The project completed a small number of activities, covering all the districts, including:

- a) Providing regular supply of disposable syringes and yellow safety boxes for safe incineration.
- b) Supplying 91 burners and fuel (LPG) for sterilization.
- c) Conducting a baseline study of waste management and injection safety practices in the province.
- d) Constructing improved waste pits at each of the 17 districts. Note: as of October 2007, this activity is complete for 10 districts and the remaining 7 districts are scheduled to be complete by November 2007.
- e) Improving the basic waste pits at 40 health facilities. Note that as of October 2007, 21 are complete and the remaining 19 are scheduled to be complete by the end of the year.
- f) Training 90 Técnicos de Saúde in management of hospital waste.

The activities in this area were significantly delayed largely due to delays in waste management policy decisions at MISAU. In weighing the most appropriate

waste treatment processes with environmental impact, MISAU was unable to make a decision that was in agreement with the project timeline.

5.2.4. Communication System

a) Objective: Establish a communication system for coordination and emergency response in the health facilities.

The project distributed 58 satellite telephones to meet communication needs in health facilities. However, the satellite phones were found to be ineffective because the phones needed to be on and outside in a reception zone to receive a call but it was impossible to know when you would expect an emergency call. In addition, the recorded messages when there was a problem making a call was in English, which most users did not understand. In 2006, the satellite phones were collected and returned to VillageReach.

The project plans to distribute codan radios to supplement other codan radio donations in the province. As of October 2007, the number of radios that will be provided and their distribution is being decided.

6. Transition to DPS

This section discusses the transition of program operations to DPS in Cabo Delgado.

6.1 Transition Planning

In April 2006, the districts of the south zone of Cabo Delgado initiated a transition experiment whereby the districts were responsible for the vaccine and supply distribution and to buy their own gas. This experiment was in preparation for the project transition to DPS scheduled for April 2007. During the experiment, no district succeeded in fulfilling the responsibilities. Reports from the field teams indicated that by mid-month, four districts had succeeded in picking up supplies, two districts had succeeded in delivering supplies to clinics, and zero districts had succeeded in purchasing their own gas. DPS evaluated the experiment and recommended that DPS abandon the idea of using a decentralized delivery system. The districts maintained delivery responsibilities, but starting the following month, the project visited all health facilities as a safety net. Districts' ability to fulfill the three basic tasks improved somewhat over subsequent months as new quarterly funds were distributed from DPS. However, these "successes" remained inconsistent from month to month and district to district.

This experiment indicated that DPS was not yet prepared for managing the delivery operations and highlighted some areas where training was necessary before the transition. The project trained relevant DPS and DDS staff for the

transition. In February 2007, the south zone of Cabo Delgado was transferred to the districts and in June 2007, the north and central zones followed.

7. Budget

Total Funds Spent 00-07	\$ 7,324,603.83		
note: Includes entire VillageReach budget	\$ 4,615,203.83	From VillageReach	63%
		From Hunter	
note: Exchange rate 6/1/05 =	\$ 1,810,000.00	Foundation	25%
1.81 British pounds to 1 USD	\$ 899,400.00	From DGIS	12%
Total Funds Spent on VidaGas 00-07	\$ 1,519,755.24		
	\$ 508,055.24	From VillageReach	33%
	\$ 724,000.00	From Hunter Foundation	48%
	\$ 287,700.00	From DGIS	19%
Total Funds Spent on the Project to Support EPI 00-07	\$ 4,644,431.76		
	\$ 2,946,731.76	From VillageReach	63%
	\$ 1,086,000.00	From Hunter Foundation	23%
note: Another \$125,000 expected in FY 2008	\$ 611,700.00	From DGIS	13%
Other Funds Spent 00-07	\$ 1,160,416.83	From VillageReach	
note: VillageReach management and general			

Breakdown of Funds from VillageReach 00-07

Total	\$ 4,615,203.83	
VidaGas	\$ 508,055.24	11%
Program to Support PAV	\$ 2,946,731.76	64%
Other	\$ 1,160,416.83	25%

8. Constraints

The project operated among various constraints that hindered or blocked progress. These constraints include the following:

- Poor initial integration between VR/FDC and the DPS/PAV team. In the beginning, there was no joint intervention process for lack of financial resources by DPS to cover the per diems and other travel expenses for its workers. This slowed the project planning and implementation.

- b) Long and stressful process of procurement for equipment, causing delays in crucial activities of the project.
- c) Scarcity of human resources and poor infra-structure quality in some health facilities, which took away from the impact of the project activities and limited the care that could be provided at health facilities.
- d) Accidents including a mini fire in the Health Centers of Metoro and Namuno due to the inadequate operation of gas equipment (gas cylinder leakage). These accidents ruined the infrastructure and created fear among health workers and the community in using gas-powered equipment.
- e) A shortage of human and financial resources that slowed the project implementation and necessitated an intervention “by area” strategy and consequently limited the impact of the project in the short-term.
- f) Difficulties in upstream logistics that interrupted the stock at the provincial deposito and resulted in stockouts and interrupted PAV services at the health facilities.
- g) Steep learning curve to use the gas refrigerator, which resulted in refrigerator problems lasting longer than what was appropriate and interrupted PAV services.

8. Lessons Learned

Throughout the duration of the project, the partners learned many lessons about supporting and improving PAV services in the province.

- a) Partners must closely and continuously coordinate activities. The project depends on each partner’s activities and contributions and a lack of coordination often results in delayed activities, which affects the entire project timeline.
- b) Continued monitoring and supervision is critical for the project’s success, even after the completion of the project. This is an especially relevant lesson for the capacity building efforts of the project because capacity building is a long process and success requires significant follow-up. Training requires constant and consistent reinforcement.
- c) Frequent human resource changes in DPS must be anticipated and included in project planning. Staff changes require additional training and supervision and can sometimes affect politics related to the project.
- d) Before the project can successfully improve stock and PAV services at the rural level, improvements must be made at the district, provincial, and even national levels. This includes solidifying the relevant policies, procedures, and supply chains.
- e) Supportive supervision completed during the deliveries is critical to improving PAV services in the rural areas.
- f) Introducing a new technology such as propane gas requires significant social mobilization and public education before it can be adopted.

- g) Coordinated delivery teams are more effective at ensuring a regular supply of vaccines and supplies than ad hoc delivery processes.
- h) Coordinated delivery teams are also a powerful communication tool to consolidate information at the district and provincial level regarding issues, problems, and trends in the rural areas.
- i) It is easy to create a system of dependency where health workers rely on delivery teams to perform maintenance on critical equipment, such as refrigerators, rather than proactively take action.
- j) Despite many major infrastructure limitations in Cabo Delgado, it is possible to maintain well supplied and equipped health facilities throughout the province.
- k) Improving supply availability and quality of services at rural health facilities is only the first step to improving rural health. Community outreach, social mobilization, and continuous health worker training are also critical components of effective PAV services.
- l) Regularly collecting, analyzing, and reporting relevant data is an effective and critical means to monitor project activities and outcomes. Data is also a powerful communication tool and a means to identify problems and successes that are not immediately noticeable.