



Health System Strengthening in Mozambique

A National Program to Improve Last Mile Distribution for Rural Communities

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VillageReach is a non-profit social enterprise. Our mission is to save lives and improve well being in developing countries by increasing last-mile access to healthcare and investing in social businesses that address gaps in community infrastructure. Our philosophy and practice is to strengthen the performance of existing health systems, serving as a catalyst to improve performance. Our intention is to minimize the degree of our own intervention for greatest cost efficiency and to leave a legacy of stronger health systems. The methodologies VillageReach develops can be used by health systems for long-term sustainable impact.

This document outlines the VillageReach program to improve the performance of the Mozambique national health system. The program objective is to significantly increase the quality of health for the millions of residents living in challenging circumstances in rural communities throughout the country. The specific approach is to strengthen the existing health system by improving the last mile distribution and supervision of vaccines and other medical commodities that health centers use on a daily basis.

The VillageReach model was first pioneered for a demonstration project conducted in northern Mozambique from 2002 to 2007. As a result of detailed evaluations of the impact of that project, the government of Mozambique has recommended that all provinces apply the VillageReach model to their vaccine distribution systems. The publication of these evaluations has also resulted in requests for VillageReach to develop other programs in Africa and Asia.

The scale of the Mozambique program is significant for two reasons. The national deployment will provide clear benefit for millions of otherwise poorly supported people living in rural communities across Mozambique. Lack of access to vaccines in these remote communities contributes to high mortality rates in children and adults. In addition, documenting the effectiveness of this approach at such a significant scale is also intended to provide compelling evidence of the cost-effectiveness and replicability of the approach for programs elsewhere in the developing world.

This document is intended for public distribution to ensure maximum transparency of the VillageReach Mozambique program. It will be updated regularly and posted on the VillageReach website. It is also intended to highlight the significant impact potential and cost efficiencies that are achievable by leveraging logistics, information management, and active last mile supervision – or supportive supervision – for health system strengthening programs, and to encourage the greater global health community to focus more resources at the last mile.

For more information on VillageReach and its activities, please visit www.villagereach.org. We welcome inquiries to our Seattle office at 206-925-5200.

Program Overview –

VillageReach is engaged in a multi-year program to improve the performance of the health system in Mozambique, focusing on rural communities that represent over 60% of the country's population. The program, started in January 2010, is expected to cover eight of ten provinces over six years. The program is dependent on available funding and the successful capacity building of each provincial government. Based on available census data, we expect more than 12 million people will be served by the program. Its purpose is to achieve systemic change in the performance of the Mozambique Ministry of Health (MISAU) through the use of dedicated distribution channels for vaccines and other medical commodities to community health centers. The following are key considerations for the program:

- Our goal is to build the capacity of MISAU to manage and expand the dedicated logistics system, which results in VillageReach decreasing its role over time as greater capacity is built to implement and manage the system in-country. The role of VillageReach is limited to technical assistance and support for the government health authority in each province - *Dirreção Provincial de Saúde (DPS)* - to manage and implement the system.
- To ensure the optimal level of VillageReach support and expenditure, the program is being rolled out in a series of staggered provincial deployments. The three-year VillageReach engagement period per province is the estimated time required to sufficiently build local capacity to manage the dedicated logistics system and evaluate its benefits.
- The program is being launched in three provinces in 2010. Funding is the chief determinant of deploying the model in future provinces. This document contains an estimated schedule of those future deployments. Changes will be updated as new information becomes available. The level of support VillageReach provides to each province may differ depending on the province's capacity.
- The DPS assumes responsibility for funding its own personnel and operating costs for its own operations to support the dedicated logistics system. All funding VillageReach receives for the program will be dedicated to VillageReach costs; contributions will not be used to fund DPS budgets.
- Measurement is a critical component of our methodology and model. An initial baseline survey and a concluding endline survey will be conducted for each provincial deployment. Data from these surveys will be publicly available upon approval from the government of Mozambique.
- Within the 3-year technical assistance period, a Field Officer employed by VillageReach will be responsible for the technical supervision and capacity building of a single province. As activities transition from the Field Officer to DPS, VillageReach will provide a semesterly supervision visit and process evaluation to evaluate the success of the dedicated logistics system implementation.
- The Fundação para o Desenvolvimento da Comunidade (FDC), a Mozambique non-profit organization that originally partnered with VillageReach on the 2002-2007 demonstration project, is taking responsibility for independently deploying the model in the remaining two provinces.
- To support the Mozambique program, VillageReach is seeking funding in terms of these broad categories of activities:
 - Personnel and associated operating costs for technical assistance provision
 - Training to build provincial capacity for system implementation
 - Program measurement: eg baseline or endline surveys

Health System Performance in Low Income Countries –

Although much time and money have been applied to strengthen medical supply distribution, supervision and information management, many systems remain ineffective, inefficient and unable to support the provision of medical commodities in order to meet the needs of the community. Significant stress is placed on rural communities due to inadequate support for community health centers. Here, the health service delivery level – or “last mile” - often functions well below its potential. Gaps in services dependent on functioning infrastructure present further challenges to health intervention operations. From its various program experiences, VillageReach sees many of the following circumstances:

- The absence of regular, reliable support to the health facility places great strain on frontline health workers. These workers are forced to travel long distances from their health center to collect and deliver paper forms, obtain supplies for their health center, and receive the training they need to execute on a multitude of assigned tasks. VillageReach estimates that health workers may spend as much as 18% of their time collecting vaccines and related supplies.
- Local vehicles serving the health center are often broken, lack fuel, be unable to travel in difficult weather, and are frequently used for other purposes. Travel costs for transport workers may not be paid for months or at all.
- Poor information systems make it difficult for the districts and provinces to know how much supplies to order.
- Unsupervised staff may do a poor job of stock rotation, ordering supplies, inventory management, and maintenance of cold chain (refrigeration units used to store vaccines) and other equipment.

The result is higher system downtime, lower numbers of children served, poorer health in the community and increased unit costs for delivery. Moreover, these barriers also delay the introduction of newer medical commodities and practices. Without adequately addressing the last mile, a choke point is created, limiting the overall distribution of essential commodities.

VillageReach Experience and History in Mozambique –

Mozambique has a national vaccination coverage rate of 72%, as measured by children vaccinated with DPT-Hep B3 (diphtheria-pertussis-tetanus-hepatitis). This is significantly below the World Health Organization’s (WHO) international goal of 90%. Mozambique suffers from high under-five mortality rates. Current figures estimate that for every 1000 live births, 154.2 children in Mozambique will die before they turn five.¹ In addition to low coverage rates, Mozambique, like many low-income countries, has a weak and poorly resourced health system. Rural health facilities are geographically isolated, often covering 10,000-50,000 community members, and they are chronically understaffed. As UNICEF reports: “Health services [in Mozambique] are inadequate in terms of coverage and quality. These facilities often have limited supplies and drugs ... and are staffed by overstretched health workers with insufficient training.”²

As a result, workers must perform a wide range of medical and support services. Training and/or picking up supplies from a district office may remove the health worker from the health center for long periods of time, during which the center closes or functions with limited staff. Responsibility to fix problems at the health center usually falls on the health worker. If needed medicines are out of stock or the necessary equipment is broken, the health worker must divert his or her attention from delivering care to resolving the infrastructure problem. Resolving these problems requires people, vehicles, time and money – all scarce resources better employed in the direct provision of healthcare services.

¹ MISAU. Mozambique National Child Mortality Study 2009: UNICEF, 2009 available at: http://www.unicef.org/mozambique/resources_5137.html.

² http://www.unicef.org/mozambique/child_survival.html

VillageReach has worked in Mozambique since the organization was established in 2001. In its initial assessment of the condition of the health system, VillageReach concluded that weak logistics practices, a lack of actionable information, and poor health system supervision were major impediments to the effective delivery of immunization services. Starting in 2002, a five-year demonstration project was conducted to ensure prompt and universal access to vaccines in the northern Mozambique province of Cabo Delgado. The ad-hoc, collection-based approach, where frontline health workers had to collect vaccines and related supplies from their district office and perform various administrative tasks, was replaced by a dedicated, integrated distribution system where a small number of specialized workers visited each health center once a month to deliver vaccines and supplies, repair equipment, facilitate an information system, and provide supportive supervision. The distribution system incorporated supportive supervision and data management with the distribution. This reassignment of tasks to create a systematic distribution process, the related information management system, and an active and ongoing recurrent training and supervision program are the core innovations of the VillageReach dedicated logistics system. The model significantly improved operational efficiency at the service delivery level, resulting in a dramatically higher immunization coverage rates for children in the region.

VillageReach released the results of an independent impact evaluation in November, 2008. In June 2009, VillageReach released the results of a complementary study comparing the costs of the VillageReach-designed logistics system with the system used in the control province of Niassa, typical of government practices used throughout the country. Following is a summary of those evaluations:

- DPT-Hep B3 vaccine coverage rates increased from 68.9% to 95.4% for children age 24-35 months. All other vaccines had similar increases resulting in an average coverage rate of 92.8%.
- The reported monthly incidence of stock outs in rural health centers decreased from 80% to 1%.
- Up-time of the cold chain increased from approximately 40% before the project to 96% over a year after the conclusion of the project.
- An average of 95% of health centers were visited each month by the dedicated logistics system staff with an average interval of 31 days in between visits, despite extremely difficult road conditions and harsh, rainy seasons.
- Over 90% of all children surveyed in the evaluation had visited a health center in the previous month despite 47% of the population living over two hours away, 85% having to walk to get there, and the most common reason for vaccination failure being “place of immunization too far.”
- The VillageReach model was 17% more cost-effective, at \$5.03 per child fully vaccinated with DPT-Hep B3 compared to \$6.07 per child vaccinated in Niassa, where VillageReach was not engaged. The VillageReach system was also 21% less expensive per vaccine dose delivered: \$1.18 per dose delivered vs. \$1.50 per dose delivered for the control province.

VillageReach Health System Strengthening Model -

VillageReach provides critical last-mile support for health intervention programs through a complementary set of skills and approaches. The strategic intent is to provide health systems with greater capacity and higher efficiency to support the health of communities. There are three categories of our support:

1. Logistics and Supply Chain Optimization

To address what we believe is one of the most pressing weaknesses of health systems in the developing world today, VillageReach has developed standard tools and practices to ensure effective distribution of medical commodities and supplies to the last-mile level. VillageReach takes into consideration the available human and financial resources and infrastructure conditions to design more efficient and effective distribution practices. Assessments of ideal distribution systems design, aggregation points for storing medical commodities, plus identifying ideal management roles/responsibilities to ensure optimal execution of the distribution practices are examples of the considerations given to designing last mile logistics systems.

2. Information Management

The design and deployment of effective supporting logistics systems are dependent on the use of information management practices that ensure adequate capture and flow of information. VillageReach's Management Information System, *vrMIS*, produces ongoing, routine metrics to enable continuous adjustments to improve health system and/or program performance. The versatility of the system enables the collection and real-time tracking of any data points defined by the program, which drives critical decision-making by health administrators and maximizes the capacity of health program workers. The system significantly enhances overall transparency of the distribution process adding a higher level of security into the supply chain. *vrMIS* also provides critical data for the management, monitoring, and evaluation of the overall program or intervention.

Designed for operating environments with varying levels of communications infrastructure, the information system allows data to be entered and reported through a convenient and intuitive web interface when Internet connectivity is available. For greater versatility, data can also be uploaded via mobile devices. Data may also be entered and stored offline when communications networks are not accessible, then securely uploaded once connectivity is re-established or transferred. VillageReach's use of Internet and mobile application technologies provides administrators of the program with a real-time, online view of system performance at the last mile level, even for communities that are well beyond the reach of the electrical grid and Internet connectivity.

3. Technical Assistance and Supportive Supervision

The provision of reliable supply chains and effective information systems are important to addressing gaps at the last mile. However systematizing technical assistance and supportive supervision for health personnel are critical to improving health sector performance at the service delivery level. VillageReach provides technical assistance and supportive supervision, and builds systems to incorporate regular supportive supervision for all aspects of the logistics and supply chain system as well as health center operations. These elements help to improve overall health facility management, stock management, data records, service provision, and adherence to national policies. The VillageReach model of supportive supervision focuses on building lasting systems to empower health workers in the facilities, so all observations and findings from supervisory visits are discussed with the staff in order to develop a shared improvement plan to guide future supportive supervision visits.

Health System Strengthening in Mozambique

Expansion Program: Overview –

Based on the documented success of the demonstration project, the Mozambique Minister of Health has formally directed officials in each of Mozambique’s provinces to pursue implementation of the model. VillageReach has already begun the process of supporting MISAU and DPS in their efforts to implement the new system across Mozambique. The three provinces of Cabo Delgado, Maputo and Niassa are already engaged in the preparation and implementation phases of the program. We expect to extend the program to Gaza, Inhambane, Manica, Sofala and Tete provinces.

Specific program objectives are:

- Improve child health in Mozambique by sustaining high vaccination coverage rates and low vaccination dropout rates;
- Improve the community’s knowledge of, trust in, and use of health services;
- Increase the capacity of DPS to manage and operate the dedicated logistics system in order to ensure sustainability of the new system;
- Increase the cost-effectiveness and cost-efficiency of the logistics systems for vaccines and other related commodities in Mozambique;
- Reduce stock outs of vaccines in all health centers where the system is implemented;
- Reduce interruptions in service delivery due to stock shortages, health worker absence and lack of health worker time;
- Integrate additional key commodities – such as rapid diagnostic tests – into the dedicated logistics system.

Impact on Health Quality –

The benefits of the Mozambique program are intended to extend well beyond the program period in which VillageReach will be engaged. We expect the Mozambique government to be able to measure long-term results for the program. However, we also expect to document relatively short-term impact, the key metric of which is increased number of children vaccinated. During the course of the program we forecast an additional 184,281 children aged less than one year will be fully vaccinated. The following chart is a breakdown per province per year of the impact the program will have on children who would otherwise not receive full immunization.

Estimate of Incremental Children Vaccinated with DPS-Led Dedicated Logistics System											
Province	Population served by Dedicated Logistics System	Vaccinatable population			Children vaccinated with current system			Total children vaccinated with Dedicated Logistics System			Incremental children vaccinated
		Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	
Cabo Delgado	1,732,750	70,696	72,110	73,552	60,092	61,294	62,519	63,627	64,899	66,197	10,818
Niassa	1,250,227	51,009	52,029	53,070	36,727	37,461	38,210	40,807	44,225	47,763	20,397
Tete	2,023,050	82,540	84,191	85,875	59,429	60,618	61,830	66,032	71,563	77,288	33,006
Manica	1,566,610	63,918	65,196	66,500	46,021	46,941	47,880	51,134	55,417	59,850	25,559
Sofala	1,826,330	74,514	76,005	77,525	53,650	54,723	55,818	59,611	64,604	69,772	29,796
Inhambane	1,426,887	58,217	59,381	60,569	41,916	42,755	43,610	46,574	50,474	54,512	23,279
Gaza	1,372,807	56,011	57,131	58,273	40,328	41,134	41,957	44,808	48,561	52,446	22,397
Maputo	1,166,376	47,588	48,540	49,511	34,263	34,949	35,648	38,071	41,259	44,560	19,029
Total	12,365,037	504,494	514,583	524,875	372,426	379,874	387,472	410,664	441,001	472,388	184,281
				1,543,952			1,139,772			1,324,053	

Population data is based on 2007 census, with 2% annual growth.

Population served is based on the year of anticipated start date for the province.

Vaccinatable population increases by 2% each year.

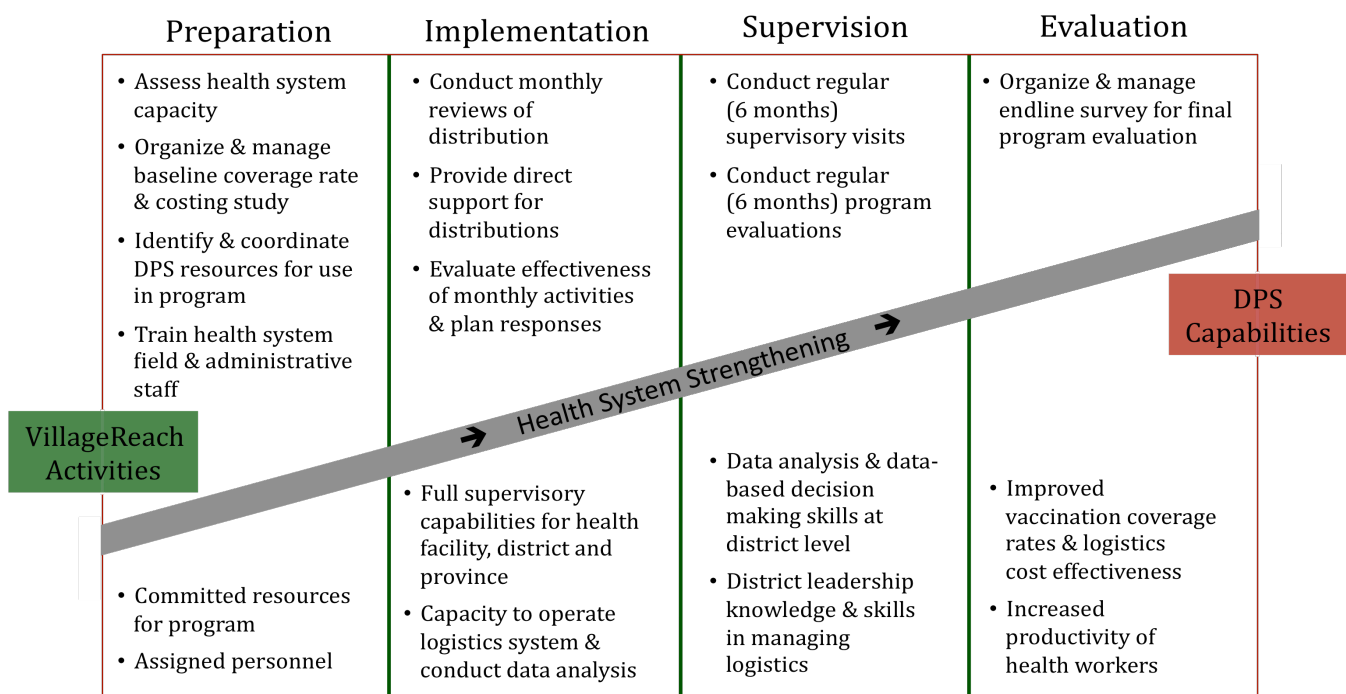
Children vaccinated with current system is based on estimates from coverage rate studies for Cabo Delgado and Niassa. All other provinces based on national rate of 72%.

Total children forecasted to be vaccinated with new system is 80% in the first year, 85% in the second year, and 90% in the third year. The exception is Cabo Delgado where it is 90% for all 3 years.

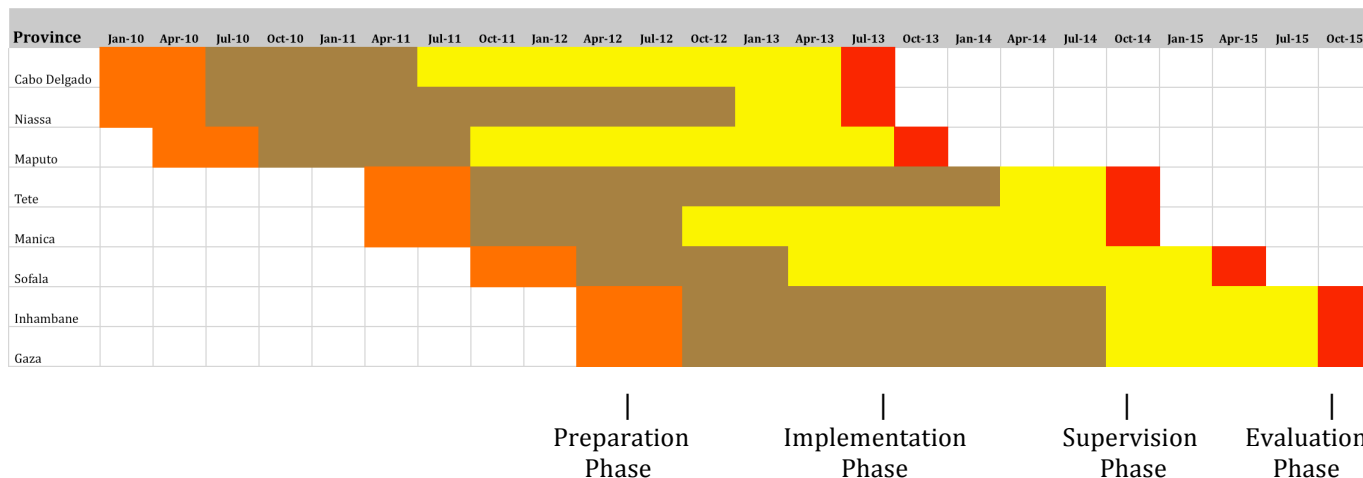
Strategic Approach -

In seeking to strengthen the Mozambique health system, VillageReach applies personnel and other resources more intensively at the beginning of each provincial implementation that subsequently decline over the three-year period as the DPS builds capacity to sustain the model. VillageReach has developed a phased approach to technical assistance for the provinces in order to ensure that adequate support and capacity is available at any stage within a three-year implementation. At the conclusion of three years, the government health system is expected to be fully independent of VillageReach resources and have documentable evidence of the benefit of maintaining the model and resources to support it well into the future. There are four phases of technical assistance for each province: preparation, implementation, supervision, and evaluation. The following chart presents a high-level view of the comparative responsibilities for VillageReach and the DPS as the program progresses in a province.

Phases of Technical Assistance -



The estimated time for implementing the different phases varies per province, according to known resources of each province. Following is a visual depiction of the anticipated time allotted to each phase of the project, by province.



The time spent to complete each of these phases depends on the capacity of each province and the resources available to support the work in each province. VillageReach provides the most intensive technical assistance during the preparation and implementation phases, with the VillageReach involvement and technical assistance greatly declining over time as the capacity of the province increases. The VillageReach technical assistance activities and key performance indicators for each phase are outlined below.

Phase 1: Preparation (4-6 months)

VillageReach works closely with DPS to plan the implementation of the system and to conduct the baseline evaluation. This includes working together to assess the current system, design the implementation of the dedicated logistics system, and identify and train the government staff needed to manage the implementation of the system. Key activities include:

- Assessment of current logistics system to identify gaps;
- Resources needed for dedicated logistics system confirmed and in place (vehicles, resources to support DPS operations, staff identified, training conducted);
- Baseline coverage rate and costing study;
- DPS staff visit another province where the system is in use for job shadowing and training;
- Training of field coordinators in logistics system, field coordinator responsibilities, and supportive supervision; and
- Training of health center staff in cold chain, immunization and vaccines, and data management.

Phase 1 is considered complete when the following indicators are met:

- Customized distribution plan is complete;
- DPS resources are committed and available for system operation; and
- Coverage rate study is complete.

Phase 2: Implementation (1-2 years)

During the implementation phase, VillageReach provides a Field Officer to support DPS in implementing and evaluating the dedicated logistics system. Once the province shows progress towards meeting the key performance indicators, VillageReach's technical assistance and the role of the Field Officer will phase out and all responsibilities are transferred to the provincial Immunization Program Chief and district immunization staff. Key activities include:

- Monthly supervision of field coordinator activities and distributions;
- Support DPS planning, budgeting, and implementation of the dedicated logistics system;
- Support DPS in conducting regular distributions, supportive supervision, and data collection to health units; and
- Support DPS in monthly activity analysis and developing and implementing recommendations.

Phase 2 is considered complete when the following indicators are met:

- Distributions of vaccines to health facilities are occurring on a regular schedule (either monthly, bimonthly, or quarterly, as determined by the province);
- The monthly funding mechanism to support the field coordinator and the distribution schedule are in place and operating for a minimum of six months) without the need for external support;
- The costs of the dedicated logistics system are included in the DPS annual plan and budget;
- The field coordinators demonstrate the knowledge and skills needed to provide supportive supervision to the staff at the health centers;
- Monthly activity analysis to support distribution is completed for at least six months without intervention by VillageReach;
- The quality of data collected by the field coordinators is accurate and complete;
- The DPS leadership can articulate the value and benefits of the dedicated logistics system;
- DPS has demonstrated ability to refine distribution system activities in response to system performance; and
- The program is meeting key distribution system indicators and targets for at least six months.

Phase 3: Supervision (~1 year)

Typical activities during the supervision phase include a supervisory visit two times per year to assess the functioning of the system, troubleshooting issues, and to review the progress towards key performance indicators. Phase 3 is considered complete when the following indicators have been met:

- The dedicated distribution system continues to run on a regular schedule with appropriate resources dedicated to its implementation;
- District leadership have increased knowledge and skills in managing logistics;
- New MISAU staff are oriented to the system and demonstrate knowledge of the operations; and
- DPS staff have capacity to train other provinces on effective implementation of the dedicated logistics system.

Phase 4: Evaluation / Impact (after 3 years of implementation)

VillageReach will assist the province in conducting a coverage rate study and cost study to measure the impact of the three years of implementation of the dedicated logistics system. Phase 4 and the full provincial program are considered complete when the following indicators are met:

- Completion of the endline study
- Documented decreases in implementation costs of the system
- Improvements in vaccination coverage rates, targeting 90%

Program Budget –

The Mozambique Program will be conducted over a six-year period, depending on the availability of funding and demonstrated readiness of each province. The estimated cost for the program is \$5,635,439. A total of \$675,389 has been raised between January 1 and May 31, 2010 in support of Mozambique. Based on the program implementation assumptions provided in the Phases of Technical Assistance Section, above, we estimate annual costs for the program per the following:

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
\$1,018,707	\$1,029,848	\$1,161,235	\$879,790	\$773,147	\$772,712	\$5,635,439

VillageReach maintains a team of program administrators who provide program management, technical training and evaluation support. The team works with national, provincial, district, and health facility MISAU employees to improve their technical skills in support of the program and to ensure appropriate levels of oversight to monitor the effectiveness of the dedicated logistics system. In addition to staffing personnel for the national program, VillageReach also incurs costs for assets it deems critical to ensure the program is implemented on schedule in each province. A summary of costs for personnel, assets and activities includes:

- **Personnel:** Personnel represents the largest portion of the VillageReach program budget. The scale-up of the national program requires greater administrative oversight in country than was previously required for the demonstration project in the north. Staff resources are:
 - Program Director and Program Assistant (Seattle) – provide overall leadership in terms of program design, customization of tools (eg. baseline and endline assessments, costing comparisons), apply global best practices to the Mozambique context;
 - vrMIS manager and assistant (Seattle) – provide overall information system design and application of vrMIS for the national program;
 - Country Director, Administrator, Program Manager (Mozambique) – responsible for ongoing dialogue with MISAU in terms of understanding and contributing to national policy and providing technical assistance, negotiate terms for agreements with each province, provide in-country day-to-day program and operations management (Program Manager will be hired depending on the concurrence of provincial implementations); and
 - Per-province Field Officer and transport driver (Mozambique) – provides day-to-day support for the provincial implementation and DPS capacity building.
- **Monitoring and Evaluation (M&E)** – significant cost is incurred to conduct baseline and endline assessments that measure both community health metrics (eg. vaccine coverage rates), distribution system costs and performance improvements of the distribution system;
- **Transportation support** – VillageReach has budgeted a single transportation vehicle (a one-ton capacity Toyota pickup truck) to support the distribution of vaccines and other medical commodities in each province. The provincial health authorities are responsible for providing an additional one to three trucks for the dedicated logistics system. To ensure the trucks are properly driven and maintained, VillageReach is retaining ownership of the vehicles and using its own drivers. Each provincial field officer requires their own transport. Used light trucks will be purchased for each field officer.