

MISSION REPORT - VILLAGEREACH

Logistics Support to Health Services - MISAU Mozambique

(Province of Cabo Delgado / April - July 2002)

BACKGROUND

VillageReach's projects follow guidelines of GAVI on Immunization, and adapt ideas of the WorldBank on PPP (Public and Private Partnership). The project concept for Mozambique integrates Public and Private Sectors. The private side is the provision of Logistics support to Health Services of DPS Cabo Delgado. The private side is the creation of a business named VidaGas, to market LP Gas. In the overall project « Vision », profits from the Gas operation finance the costs of Logistics support to DPS.

The Gas plant is now under construction in Pemba. Completion is scheduled for September 2002. Capacity for expanding production exist in Nacala. On or about September 15, domestic gas cylinders, and a range of gas appliances (lamps, stoves etc.) will become available for sale in Pemba, and through the Cabo Delgado province.

On or about September 15, 31 new gas refrigerators will be installed at health facilities in 5 districts of Cabo Delgado. These vaccine refrigerators will replace the kerosene models which are much less efficient. The procurement of motorcycles will complete the Logistics equipment provided by the project. Total costs is around 100,000 USD

But more important than providing cold chain equipment, VillageReach's objective is the building of capacity at DPS to manage Logistics of Health Services. The following report is the summary of activities initiated to actually implement VillageReach's Logistics support to DPS Cabo Delgado.

1. OBJECTIVE OF MISSION

Implement a term of the Collaborative Agreement signed between MISAU and VillageReach.

Establish a Logistics structure, and assist DPS Cabo Delgado in cost-effectively delivering vaccines, and other health commodities. The Cabo Delgado province is 82,000 Km² large, and has 1.5 million habitants. The province is divided into 17 districts, and comprises 90 Health Units.

2. METHODOLOGY

- Establish Logistics Base.
- Assess Logistics Indicators In 3 districts. (Annex 1)
- Analyze and discuss results with DPS. (Annex 2)
- Elaborate plan of intervention with DPS and districts. (Annex 3)

3. RESULTS

3.1 Establishment of Logistics Base

From April to July 2002, the following was done towards establishing VillageReach-Pemba.

- Obtain office space from DPS at the Central Medical Warehouse in Pemba.
- Purchase office furniture and equipment.
- Establish voice and electronic communications.
- Purchase of one Toyota Pick-up truck of 1 ton capacity.
- Purchase one Honda 125 XL motorcycle.
- Recruit Commercial Manager (*).
- Recruit Field Coordinator.
- Recruit Driver Mechanic.
- Recruit Domestic Supervisor.

(*). Running the « Gas » side of the Project.

Presently, VillageReach Pemba is managing « Operations » for the routine delivery of vaccines and of medical commodities. New management capability includes the recording of data, to later measure « Indicators ». VillageReach still needs to recruit a « Project Manager ». This managerial resource is key to the expansion of the project, and to productive collaboration with DPS.

3.2 Distribution of vaccines and health commodities

Based on the evaluation of Logistics Indicators (Annex 1), a plan of intervention was designed for each district (Annex 3). One part of the plan was to review forecasts for vaccines and syringes, and for other health commodities (Ex : essential drugs, medical oxygen, fuel, etc.). The other part of the plan was to consolidate these commodities into « units », and to schedule deliveries of these « units » to individual health facilities.

*Per diems
Fuel*

From 3rd to 8th July 2002, 7 tons x 60 cubic meters of medical supplies were distributed to 22 health facilities, within 3 districts. Distribution operations were done in two stages:

In the first stage of distribution, three (3) shipments of approximately 2 ton each were first made to the cities of Montepuez, Blama, and Namuno. These deliveries were to district health centers only. This first stage of distribution was done with DPS's truck, and staff. A minor repair was paid by VR to speed truck's availability. Three days, 1,500 kilometers, and 450 liters of diesel fuel were necessary to cover these 3 circuits. Total expenditures, including per-diems of 2 DPS staff is 7,795,000 Mt, or 300,00 USD. The

*Fuel
41,500,000
Per diems*

Per diems = 3,295,000

*3 days
1,500 km
450 lts diesel*

The second stage of distribution consisted of 19 circuits, from the 3 district health centers of Montepuez, Namuno and Balama, to their respective health units. This second stage of distribution was done with VillageReach's pick-up truck, assisted in Balama by the district vehicle. Six days, 2,000 kilometers, and 400 liters of diesel fuel were necessary to cover these circuits. Total expenditures, including per-diems of 2 VR staff is 10,525,000 Mt, or 450,00 USD.

The exercise revealed that « real costs » for distributing supplies to 22 facilities in 2 districts is 750,00-USD per month. This is an average of 250,00 USD per month per district. Or 34,00 USD per month/per facility. In discussions with district Directors and DPS, it appears that these costs could be borne directly by the districts. With the proper technical support, the districts could even make the deliveries using their own vehicles. The majority of the 17 districts have just recently received new Toyota Land Cruisers.

During the deliveries from district health centers to peripheral health units, the district of Balama contributed the use of its vehicle, thus reducing by 50% its schedule of distribution. The poor roadworthiness of the Balama district vehicle is worth noting. The Essential Drugs truck of DPS also required urgent maintenance before distribution operations.

3.2.1 Stock control

At each facility where vaccines and syringes & incinerator boxes are delivered, stocks were « adjusted ». Based on a forecast per facility, existing stocks were topped-up, or reduced. Over a short period of time, the same method will be applied to control stocks of all other commodities.

3.2.1.1 Vaccines

A situation of chronic shortage of vaccines (and of stock-outs exists in the province. It particularly affects BCG and Polio vaccines. Two possible causes are responsible for these occurrences.

- Underestimation of needs. The standard wastage factor of « 1.33 » is utilized in forecasting national needs. This is to anticipate a wastage of 25%. But in reality, wastage of BCG vaccine often reaches near 80%. The adoption of a factor of « 4 » would be more in line with calculating actual needs.
- Financial and Logistics constraints. The supply of vaccines from Maputo to Pemba is often broken because of late, insufficient, or no funding to pay airshipment. Weak transport, and little funding is responsible for the break in vaccine supply between Pemba and the districts, and between the districts and their peripheral health facilities.

The cycle of monthly distribution now allows the close monitoring of vaccine. ~~It is new, capability to analyze consumption patterns is used to measure real wastage at the point of use.~~ Compilation of data (Annex 5) over the next 3 months should reveal real wastage per antigen, and per health facility. Results from these measurements will help to further adjust stocks with even more accuracy.

3.2.1.2 Syringes & Incineration

After regulating the distribution of incinerator boxes, their « Proper » utilization needs to be ensured. The reinforced transport capabilities of the EPI District Supervisor is a positive factor in increasing compliance to incineration.

Three stationary incinerators operating on gas LP Gas will operate in Pemba, Montepuez, and Moacinboa Da Praia. MISAU and VillageReach should finalize site selection, and a protocol on Medical Waste prior to installing and commissioning the equipment.

3.2.1.3 Fuel

During deliveries, petrol was purchased in Balama for one health facility. Although districts have the necessary means (on paper) to buy petrol locally, the process of actually getting liquidity is an administrative challenge.

Eventually, that scheme will be used to purchase LP gas. It would be judicious that DPS Cabo Delgado, together with VillageReach, review the situation before districts begin to receive Gas refrigerators.

Review
LRF
*
P
meat

3.2.1.4 Spare Parts

A small quantity of spare parts was recently despatched from Maputo, along with BCG and other vaccines. A repartition of these spares was made according to priorities. The opportunity of the first delivery of commodities was taken to bring them where needed.

But as with vaccines, the forecasting of spare parts needs reviewing. New basis for calculation needs to be agreed upon, with the participation of the Maintenance Services of DPS. Once the real requirements have been defined, procurement (finances) and distribution (logistics) arrangements need to be integrated in VR's routine Logistics Operations.

3.2.1.5 Essential Drugs

The management of « Essential Drugs » in the province is the responsibility of the « Pharmaceutical » division. When drugs are received from Maputo and/or Nacala, the division makes a quarterly schedule of distribution. The division then delivers drugs to facilities using its 4 ton Toyota truck. But the actual distribution of drugs to facilities is often constrained by the availability of funds (fuel, per-diem etc.), and/or the condition of the truck (maintenance).

To implement this first distribution operation, VR provided fuel, maintenance, and per-diem for DPS' truck and staff. Three shipments of vaccines, syringes, incinerator boxes, and other medical supplies were consolidated with the Essential Drugs, and delivered to district health centers using DPS's truck. VillageReach's pick-up truck was utilized to transport vaccines and essential drugs from district health centers to peripheral facilities.

Up to the beginning of July 2002, Essential Drugs stocks were almost « dry » in the 3 districts. As a result of VillageReach's collaboration with DPS, all facilities (except Papai in Namuno) are now stocked with three months worth of Essential Drugs.

3.3 Maintenance

The districts have limited capacity to ensure the maintenance of their cold chain and Logistics equipment. Only the « Neste » solar fridges maintained by Medicus Mundi work without failure. The refrigerator of Nairobi « Zero » had to finally be transported back to Montepuez (using VR's pick-up), after several failed attempts by the EPI District Supervisor to mend it.

Refrigerators have been down for 2 months in Namanhumbiri, Nairobi, and Linde (Montepuez), and Nitele (Balama).

3.4 Support to Outreach

Problems of outreach were assessed during the evaluation of « Logistics Indicators » for the 3 districts. Following discussions on the subject with District Directors and EPI District Supervisors, a consensus was reached on the necessity to carefully « Microplan » needs by health facility. For this purpose, the « outreach » planning... Was designed.

This approach ranks health facilities by the importance of the populations they cover, and by the difficulty of access to these populations (Villages). Categorizing facilities this way offers a sound base in allocating motorcycles, and/or other transport resources for outreach activities. The detailed update on populations will be key in separating coverage results obtained in « fixed » and « outreach » strategies.

3.5 Quality control

Two aspects of Logistics touching the « Quality » of vaccination services are addressed by VillageReach' Operations :

- Freezing of TT vaccines
- Handling of Measles vaccine

3.5.1 Avoiding the Freezing of TT and DPT/Hep B

In adopting GAVI, MISAU newly introduced the DPT/HepB vaccine, and some logistics challenges, to its EPI Programme. The propensity of this vaccine to be damaged by freezing temperatures is rather high. The risks of freezing DPT/HepB are elevated for MISAU because its cold chain is made of kerosene refrigerators, which are difficult to regulate at low temperatures (0°C to + 2°C). VillageReach is bringing a technical solution to this problem by providing Gas operated refrigerators. A gas operated cold chain offers better temperature controls at low ranges, than a kerosene operated one. VillageReach also updates the EPI district Supervisors on best practices in handling TT and DPT/HepB vaccines during fixed storage, and during transport.

But a one time switching to better cold chain, will not completely eliminate the risks of freezing these vaccines. VillageReach and the districts have taken steps to reinforce the regular monitoring, recording, and supervision of cold chain temperatures throughout the province. For example, electronic temperature sensors will be placed at random in refrigerators, and their temperature readings downloaded routinely. The electronic info will be regularly compared to the temperatures records taken manually by health workers on paper forms.

3.5.2 Investigating the handling of Measles vaccines

The greatest number of measles cases for 2001/ 02 in Mozambique was found in the province of Cabo Delgado. This, despite the high coverage obtained for this antigen (120%).

The National EPI Programme, and DPS are deeply concerned with this situation.

VillageReach is now working with DPS and the districts to investigate the existence of possible « Logistics » reasons to this phenomenon. For example, evidence of improper handling of measles vaccine during conservation, reconstitution, and injection. Surveys of health facilities have revealed a general overstock of measles vaccine. Vials of measles vaccines had also been returned to refrigerators after utilization, instead of being discarded. A protocol is under development with DPS to monitor during six months the « Logistics » of measles immunization in the five districts of Montepuez, Namuno, Balama, Chiture and Ancuabe.

4. NEXT STEPS

4.1 Logistics Base

4.1.1. Time the recruitment of VR's Project Manager with the installation and commissioning of gas fridges. Expand scope of work, job profile, and remuneration package.

4.1.2. Set internal regulations regarding :

- Amount of per-diem paid to VR local Staff.
- Utilization of VR motorcycle.
- Expenditures and accounts.

4.2 Distribution of supplies

4.2.1. Compile over six months the « real costs » for distribution of vaccines and supplies in five districts of the southern « Zone» of the province.

4.2.2. Determine average cost of deliveries per district. Use result as « standard » unit cost per delivery operation, and monitor.

4.2.3. Study with DPS and districts possibilities of « bi-monthly » distributions to selected facilities. Arrange special deliveries to facilities which become cut-off during rainy season.

4.2.4. Study logistics implications (schedules, costs) of pushing « Kit C » all the way to villages. The support to « integrated » outreach activities.

4.3 Stock control

4.3.1. Study with National EPI and DPS means of ensuring regular supply of vaccines and commodities between Maputo and Pemba. Discuss with DPS situation of stocks for Papai.

4.4 Maintenance

4.4.1. Define terms of collaboration between VR and DPS regarding fleet maintenance.

4.5 Quality Control

4.5.1. Establishment of Protocol for the survey of measles vaccine handling.

PROGRAMME OF ACTIVITIES
(15 July to 15 September 2002)

No	Activity	Dates	Responsible	Costs (\$ approx.)	Observations
1	Communications and updates	15 July to 15 September	- LP - Judja-Sato - Nakagawa - Lavril - Loureiro - Duraõ	1000,00	Regular phone contacts between project members to follow-up, update and control planned activities.
2	Distribution of vaccines and medical supplies to disatrics	5 to 8 August	- LP - Duraõ - (EPI / DPS) Paolo - EPI District Supervisors	250,00	To carry out this activity, only VillageReach's staff and truck will be utilized. Assistance from the Essential Drug truck will not be necessary. ?
3	Monitoring of vaccine stocks. Update of records on wastage.	"	- LP - Duraõ - (EPI / DPS) Paolo - EPI District Supervisors	-	Activities 3, 4 and 5 are the routine monitoring of « Logistics » parameters required to measure indicators.
4	Inspection of temerature recording sheets	"	- LP - Duraõ - (EPI / DPS) Paolo - EPI District Supervisors	-	
5	Monitoring of injection safety	"	- LP - Duraõ - (EPI / DPS) Paolo - EPI District Supervisors	-	
6	Distribution of vaccines and medical supplies to disatrics	9 to 13 September	- LP - Duraõ - (EPI / DPS) Paolo - EPI District Supervisors	250,00	VillageReach's staff and truck only. why not using measles truck?
7	Monitoring of vaccine stocks, cold chain temperatures, and injection safety	"	- LP - Duraõ - (EPI / DPS) Paolo - EPI District Supervisors	-	Routine monitoring of « Logistics » parameters
8	Finalization of protocol on monitoring of « measles logistics »	"	- LP - Duraõ - (EPI / DPS) Paolo - EPI District Supervisors	500,00	Technical assistance from WHO and/or PATH.

ANNEX 1 - LOGISTICS INDICATORS

1. Activity Indicators: Measure the volume of activity

1.1 number of kids vaccinated: monitor the Measles vaccine or the DTP to be consistent with GAVI

1.2 number of mother vaccinated: monitor TT vaccine
These indicators could be further divided along "fixed locations" vs. "outreach"

- Fixed
- Outreach

2. Availability Indicators: Measure the ability to deliver the right product, at the right location, at the right time and in the right quantity.

2.1 number of stock out on critical items (e.g., vaccines, fuel, LPG, oxygen, ...). this indicator should capture the disruption of activities at the health facilities and help refine stock management (e.g., adjustment of reserve stocks)

2.2 wastage of vaccines: two types of wastage will be monitored "close vials" and "open vials"

3. Cold Chain Indicators: Measure the performances of the cold chain

3.1 number and duration of downtime:

3.2 temperatures: TTM will be used to monitor our ability to maintain temperatures within a target range

4. Safety of Injections Indicators: Measure our ability to ensure safe injection

4.1 compare the number of AD syringes vs. the "number of injections

4.2 compare the number/weight of AD syringes delivered to the number/weight of AD syringes collected

5. Transport Indicators: Measure the performance of the logistics system

5.1 availability of vehicles

5.2 cost per km

ANNEX 2 - MEASURED INDICATORS

**Districts of : Montepuez, Balama and Namuno
Cabo Delgado Province – Mozambique (May 2002)**

1. Activity Indicators

Total Population of Montepuez district 169.500 Hab.

DPT 3 coverage 1st quarter 2002 = 67.7 %

TT 2 coverage 1st quarter 2002 = 32.0 %

Total Population of Balamama district 118.511 Hab.

DPT 3 coverage 1st quarter 2002 = 24.9 %

TT 2 coverage 1st quarter 2002 = 33.5 %

Total Population of Namuno district 54.470 Hab.

DPT 3 coverage 1st quarter 2002 = 18.1 %

TT 2 coverage 1st quarter 2002 = 155 %

Combined population of three districts : 342.481 hab

- Children 0 – 11 months 13.700

- Pregnant women 17.125

- Women of child bearing age 85.278

▪ **Combined Coverage for DPT 3 = 36.6 %**

▪ **Combined Coverage for VAT 2 = 73.6 %**

Observations :

Coverage not desagragated between « fixed » vs « outreach »

Three target populations are identified for TT :

- « Women of Child Bearing Age » (15 to 49 yrs), is 24.9% of total population.
- « Pregnant Women » is 5% of the total population, but is included in the 14 to 49 yr target.
- « School Children » is the last group, but is outside of the 15 to 49 yrs target

1.1 Health facilities of Montepuez, Balama and Namuno

Category	Total	Status		
		Govt.	Priv.	Mix.
Hospital	1	1	0	0
CS(1)	2	2	0	0
CS(2)	2	2	0	0
CS(3)	10	10	0	0
PS	7	7	0	0
Grand Total	22	22	0	0

There are 22 health facilities serving a total population of 342.481 habitants. 100% of facilities are Government owned and operated. « Medicus Mundi », a Spanish Organization, supports EPI Logistics with installation and maintenance of « Neste » solar refrigerators.

2. Availability Indicators :

2.1 Health facilities who do not offer vaccination services

Category	Total	Status		
		Govt.	Priv.	Mix.
Hospital	1	1	0	0
CS1	0	0	0	0
CS2	0	0	0	0
CS3	1	1	0	0
PS	2	2	0	0
Grand Total	4	4	0	0

The district hospital in Montepuez, the Nitele health post (Balama), the Nropa health post (Montepuez), and the Papai health centre (Namuno) do not offer vaccination services.

2.2 Reasons for not offering vaccination services

Reasons	Total	Govt.	Priv.	Mix.
No cold chain	2	2	0	0
No vaccines	(*)			
No syringes	(*)			
No personnel	1	1	0	0
No petrol	0	0	0	0
Other reasons	1	1	0	0
Grand Total	4	4	0	0

(*) See 2.3 « Stock outs»

In 2 facilities, the absence of Cold chain was responsible for not providing vaccination services.

2.3 Stock outs

Item	Total	%
Vaccines	22	100
Syringes	9	40
Incinerator boxes	15	50
Petrol	4	18

Stock-outs are general to all health facilities, particularly for BCG vaccine. This same situation was observed in northern districts of province, during last year's quick assessment of Logistics. An average 50% of facilities had stock-outs of syringes and Incinerator boxes. 18% of facilities had no petrol in reserve.

2.4 Situation of vaccines stocks

In the table below, estimations of monthly vial consumptions are compared to stocks present at health facilities. The situation of each vaccine is described in three columns as follows :

- Column one : « Est. » is calculated number of vials per monthly delivery.
- Column two : « Stock » is the actual number of vials found for each vaccine.
- Column three : « Status » is the stock situation of each vaccine, such as :
 - = indicates that stock level is correct
 - indicates that stock is below correct level
 - + indicates that stock is above correct level

Table of comparison
Estimated projections V/S existing stocks

Health Facility	BCG			DPT/Hep B			Polio			Measles			VAT		
	Est.	Stock	Statut	Est.	Stock	Statut	Est.	Stock	Statut	Est.	Stock	Statut	Est.	Stock	Statut
Balama District															
Kwekwe	23	0	0	36	8	-	54	0	0	18	39	+	30	32	=
Mpiri	18	0	0	28	24	=	42	15	-	14	33	+	23	42	+
Mavala	12	3	-	20	11	=	29	0	0	10	70	+	16	45	+
Ntete															
Metata	10	0	0	16	0	0	23	0	0	8	0	0	13	0	0
Balama	123	49	-	197	141	-	292	115	-	99	78	=	164	132	=
Total	186	52	-	200	184	=	440	130	-	149	220	+	246	251	+
Montepuez District															
Nairobi	6	0	0	10	4	-	15	16	=	5	6	=	9	3	-
Montepuez	67	0	0	107	0	0	158	0	0	53	0	0	89	0	0
Namueto	8	0	0	13	5	-	19	10	-	1	13	+	11	8	=
Linde	16	0	0	26	0	0	38	0	0	13	0	0	21	0	0
Napupulo															
Nropa															
Mirate	34	0	0	54	18	-	79	14	-	27	8	-	45	10	-
Namanhumbiri	18	0	0	30	20	-	44	0	0	15	27	+	25	8	-
Vaccine Store	177	100	-	282	75	-	418	342	-	141	144	=	235	127	-
Total	326	100	-	522	122	-	771	382	-	255	198	-	435	156	-
Namuno District															
Meloco															
Papai	12	0	0	20	0	0	29	0	0	10	0	0	16	0	0
Hucula	9	0	0	15	33	+	22	3	-	7	38	+	12	54	+
Machoca	20	0	0	31	13	-	46	1	-	16	18	=	26	12	-
Ncumpe	28	0	0	44	4	-	65	0	0	22	13	-	37	19	-
Nanrapa	12	2	-	20	4	-	29	1	-	10	41	+	17	47	+
Namuno	57	0	0	91	98	=	134	0	0	45	139	+	75	37	-
Total	138	2	-	221	152	-	325	5	-	110	249	+	183	169	=
Grand Total	650	154	-	943	458	-	1536	517	-	514	667	+	864	576	-

$$\begin{array}{r} 22 \\ - 4 \\ \hline 18 \end{array} \text{ EPI}$$

Summary of vaccine stocks situation :

General stock outs of BCG everywhere, because of its unavailability at Pemba. But although stocks were present at the Montepuez depot, no distribution were made to health facilities. Stock levels of DPT/Hep B were correct in 18% of facilities. But 20% of facilities had stock-out of DPT/HepB, and 5% were over stocked. As for Polio, nearly 50% of facilities had stock-outs, and 40% below correct level.

On the other hand, 50% of facilities were overstocked with Measles. Likewise, 30% of facilities were overstocked with TT.

Nota : Opened vials of Measles vaccine were found at health facilities.

Nota : The disparate stock patterns did not allow for the capture of « wastage »

3. Safety of Injections Indicators :

- * 50% of health facilities experienced stock-outs of syringes
- * 40% of health facilities had stock-out of incinerator boxes
- * Few facilities actually incinerate used syringes and needles

4. Cold Chain Indicators

4.1 Inventory of cold chain equipment

Equipment	Total	Unit cost USD	Total cost USD
Refrigerator RCW 42 EK	7	1.500	10.500
Refrigerator RAK 1302	1	1.000	1.000
Refrigerator Zero	5	600	3.000
Refrigerator Neste	7	3.000	21.000
Refrigerator Minus 40	2	1.200	2.400
Refrigerator Vibocold	1	300	300
Freezer Defy	1	500	500
Cold box RCW 25	10	100	1.000
Cold box RCW 12	8	50	400
Vaccine carrier type 1	11	25	275
Vaccine carrier type 2	13	25	325
Vaccine carrier type 3	12	25	300
Ice packs	454	1	454
Incinerator box	2166	1.50	3.249
Liters of petrol	99	0.4	39.60
Thermometers	17	2	34
Defroster spatulas	4	1	4
Grand Total			44.780.60

The 24 refrigerators inspected are from 7 different manufacturers, and nearly 20% of the equipment is not approved by WHO UNICEF. Types of cold boxes and vaccine carriers are standardized, and approved.

4.2 The cold chain by age

Equipment	Total	1 to 2 years	2 to 5 years	5 to 10 years	10 to 20 years
Refrigerator RCW 42 EK	7	2	1	4	0
Refrigerator RAK 1302	1	0	0	0	1
Refrigerator Zero	5	5	0	0	0
Refrigerator Neste	7	0	7	0	0
Refrigerator Minus 40	2	0	2	0	0
Refrigerator Vibocold	1	1	0	0	0
Freezer Dely	1	0	1	1	0
Grand Total	24	8	10	5	1

30% of the equipment is 1 to 2 years old. Nearly 40% is between 2 and 5 years old. This age group includes 7 « Neste » solar refrigerators, which are in very good working condition. 22% of fridges are between 5 and 10 years old, and 1 refrigerator is nearly 20 years old.

4.3 Types of energy of cold chain

Type	Number	Energy cost / year USD
Petrol	13	1,752
Electricity	1	25
Solar	10	800
Total	24	2,602

59% of the cold chain operates on petrol. But the use of solar rates high, with 40% of the equipment using photovoltaic energy. Estimation of energy costs are based on the cost of petrol, and on the cost of replacing batteries of solar systems.

4.4 Vaccine storage volume

Required Volume Refrig.	Volume available	Status	Required Volume Freezing	Volume available	Status
220	645	+	30	150	+

Net storage volume required through the 3 districts is 220 liters. Consolidated storage space available is 645 liters. The capacity in freezing space is also exceeded.

Note : The split between refrigeration and freezing spaces is not required at district and health facility level. Particularly for short periods of time (1 month).

4.5 Maintenance

Non-functioning cold chain equipment

Types of failures	Total	%
No petrol	0	0
No spare parts	6	85
Reform	1	15
Grand Total	7	100

4.5.1 Duration of equipment break-down

Nr fridges Out of order	1 to 2 weeks	2 to 4 weeks	10 to 72 weeks
2	0	0	2

6. Essential Drugs

The distribution of Essential Drugs is part of VillageReach's Operations. Three types of drug « Kits » are routinely in use at health facilities They are :

- « Kit A » is delivered to Health Centers only. The kit contains 37 products, and 1 is allocated for every 1,000 external consultations. The kit measures 0.2 m3, and weighs 56 kg
- « Kit B » is delivered to Health Posts. The kit contains 22 products, and 1 is allocated for every 500 external consultations. The kit measures 0.1 m3, and weighs 31 kg
- « Kit C » is delivered to APE only. The kit contains 15 products, and 1 is allocated for every 250 external consultations. The kit measures 0.03 m3, and weighs 14 kg

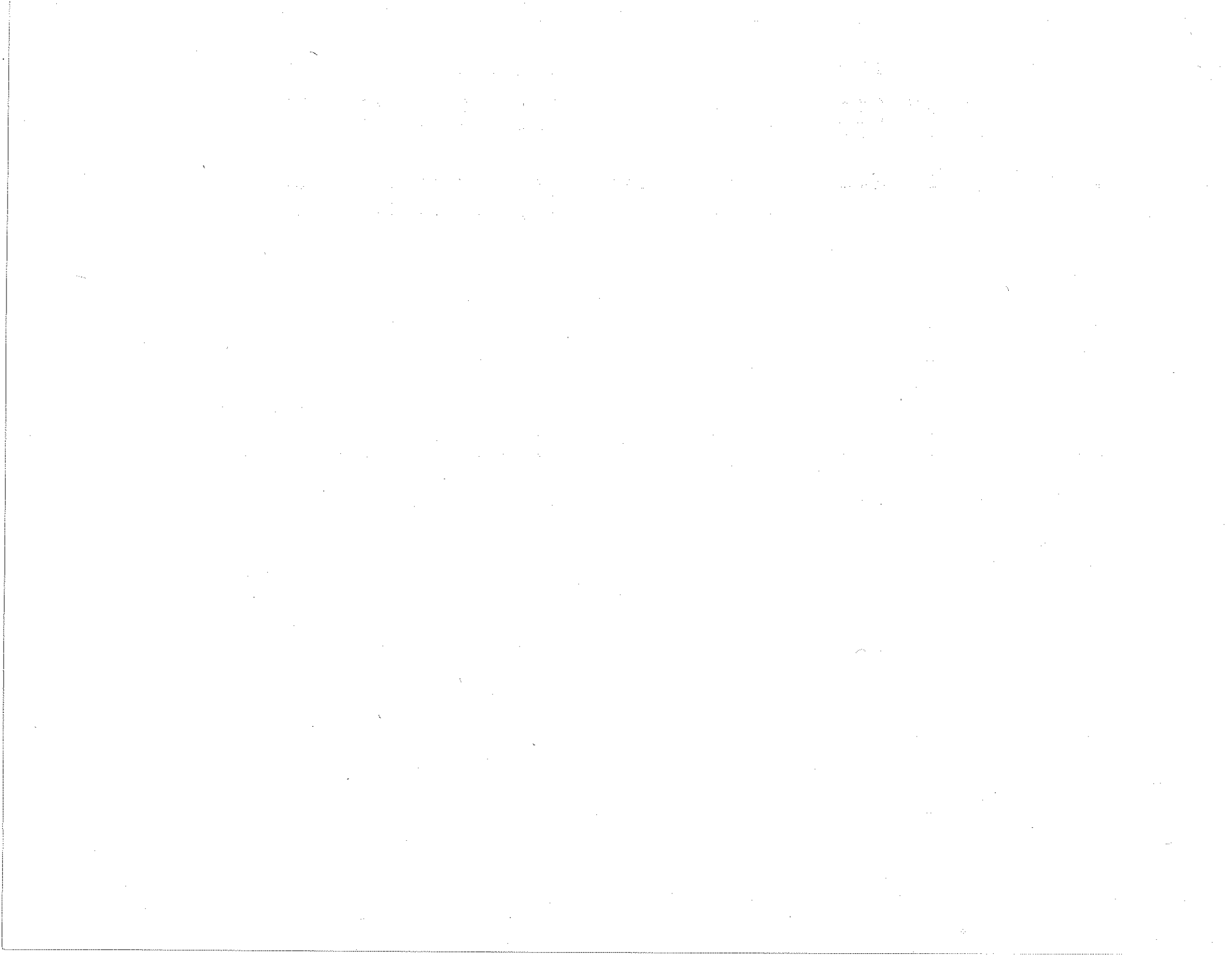
During the survey of Montepuez, Balama, and Namuno districts, data was collected at each facility on the number of monthly consultations. Based on the criteria for allocating kits, and on the information gathered on number of consultations per health facility, an estimation was made for kits requirements.

Essential Drugs estimations for Montepuez, Balama and Namuno

	Type	Nbr of monthly Consultations	Nbr Kit A	Nbr Kit B	Nbr Kit C	Volume M3	Weight Kg
District of Balama							
Kwekwe	PS	500	0	1	?	0.1	31
Mpiri	CS3	?	1	0	?	0.2	56
Mavala	CS3	550	1	0	?	0.2	56
Niale	CS3	300	1	0	?	0.2	56
Metata	PS	550	0	1	?	0.1	31
Balama	CS1	1200	2	0	?	0.4	112
		3,100	5	2	?	1.2	342
District de Montepuez							
Nairoto	PS	300	0	1	?	0.1	31
Montepuez	CS2	1500	2	0	?	0.4	112
Namuelo	CS3	776	1	0	?	0.2	56
Linde	PS	150	0	1	?	0.1	31
Napupulo	CS3	500	1	0	?	0.2	56
Nropa	PS	200	0	1	?	0.1	31
Mirate	CS3	200	1	0	?	0.2	56
Namanhumbiri	CS3	300	1	0	?	0.2	56
Vaccine store		0	0	0	?	0	0
		3,926	6	3	?	1.5	429
District of Namuno							
Meloco	CS3	400	1	0	?	0.2	56
Papai	CS3	300	1	0	?	0.2	56
Hucula	PS	350	0	1	?	0.1	31
Machoca	CS3	300	1	0	?	0.2	56
Ncumpe	CS2	500	1	0	?	0.2	56
Namrapa	CS3	400	1	0	?	0.2	56
Namuno	CS1	2825	3	0	?	0.6	168
		5,075	8	1	?	1.7	479
		12,101	19	6	?	4.4	1,250

The above estimations only covers Health Centers (Kit A), and Health Posts (Kit B). Estimations of Kit C to the APes, health facilities which are below health posts, are not yet taken into consideration.

Monthly deliveries of Kit As and Kit Bs to the three districts will occupy about half the weight and volume capacity of a 1 Ton Pick-up truck. This would leave another half for vaccines, syringes, and gas cylinders.



ANNEX 3 - PLAN OF DISTRIBUTION

No	Circuits	Vaccines	Syr.	Inc. box	Kit A	Kit B	Kit C	Petrol	Oxyg	Gas	VOL	WT	KM	FUEL	ALW	Total \$
MISAU Truck - District HC																
1	Pemba – Montepuez	1142	8508	85	6	3	0	0	0	0	892	462	210	63	0	25
2	Montepuez - Namuno- Montepuez	1102	8205	82	8	1	0	0	0	0	861	511	120	36	1	68
3	Montepuez - Balama – Montepuez	783	5833	58	5	2	0	0	0	0	612	364	120	36	0	14
4	Montepuez - Pemba	0	0	0	0	0	0	0	0	0	0	-	210	63	0	25
	Total	3027	22546	225	19	6	0	0	0	0	2,365	1,337	660	198	1	133
VR Truck - Namuno District																
1	Pemba - Montepuez - Namuno	0	0	0	0	0	0	0	0	0	0	-	270	54	0	22
2	Namuno – Hocula	58	432	4	0	1	0	0	0	0	45	33	70	14	0	6
3	Hucula - Machoca	124	922	9	1	0	0	0	0	0	97	60	45	9	1	58
4	Machoca – Papai	78	656	6	1	0	0	0	0	0	69	58	30	6	0	2
5	Papai – Namuno										0	-	74	15	1	60
6	Namuno - Ncumpe	175	1306	13	1	0	0	0	0	0	137	61	40	8	0	3
7	Ncumpe - Nanrapa	79	587	6	1	0	0	0	0	0	62	58	32	6	0	3
8	Nanrapa - Namuno - Meloco	172	1281	13	1	0	0	0	0	0	134	61	78	16	0	6
9	Meloco - Montepuez										0	-	50	10	0	4
	Total	686	5184	51	5	1	0	0	0	0	543	331	689	138	2	163
VR Truck - Balama District																
1	Montepuez - Balama	0	0	0	0	0	0	0	0	0	0	-	60	12	0	5
2	Balama – Kwekwe	144	1079	11	0	1	0	0	0	0	113	35	38	8	0	3
3	Kwekwe – Mpiri	111	829	8	1	0	0	0	0	0	87	59	25	5	1	56
4	Mpiri – Balama	0	0	0	0	0	0	0	0	0	0	-	20	4	0	2
5	Balama - Metata-Balama	62	465	5	0	1	0	0	0	0	49	33	20	4	1	56
6	Balama -Mavala-Balama	78	578	6	1	0	0	0	0	0	61	58	40	8	0	3
7	Balama - Ntete-Balama	58	431	4	1	0	0	0	0	0	45	58	30	6	0	2
	Total	453	3382	34	3	2	0	0	0	0	355	243	233	47	2	127
VR Truck - Montepuez District																
1	Montepuez - Nairoto-Montepuez	41	306	3	0	1	0	0	0	0	32	32	130	26	0	10
2	Montepuez - Linde-Montepuez	101	758	8	0	1	0	0	0	0	80	34	40	8	1	57
3	Montepuez-Mirate-Montepuez	213	1583	16	1	0	0	0	0	0	166	62	84	17	0	7
4	Montepuez - Nropa	56	416	4	0	1	0	0	0	0	44	33	31	6	1	56
5	Nropa - Mapupula	138	1032	10	1	0	0	0	0	0	108	60	11	2	0	1
6	Mapupula-Montepuez-Namueto	51	382	4	1	0	0	0	0	0	40	57	25	5	1	56
7	Namueto-Niamanhumbiri	118	874	9	1	0	0	0	0	0	92	59	35	7	0	3
	Total	718	5351	54	4	3	0	0	0	0	561	338	356	71	3	190

**Rationning of Vaccine Distribution - VillageReach
(Pemba July 2002)**

Health Unit	BCG			DPT/Hep B			Polio			Measles			TT		
	Est.	Dist.	Statut	Est.	Dist.	Statut	Est.	Dist.	Statut	Est.	Dist.	Statut	Est.	Dist.	Statut
District de Balama															
Kwekwe	18	9	-9	29	29	=	58	30	-28	18	18		30	30	
Mpiri	14	7	-7	22	22	=	45	25	-20	14	14		23	23	
Mavala	10	5	-5	16	16	=	31	20		10	10		16	16	
Ntete	7	4	-3	12	12	=	23	20							
Metata	8	4	-4	13	13	=	25	20		8	8		13	13	
Balama	41	20	-21	66	66	=	133	75		99	99		164	164	
Total	98	49	-49	158	158	=	316	190		149	149		246	246	
District de Montepuez															
Nairoto	5	5	=	8	8	=	17	13		5	5		9	9	
Montepuez	53	15	-38	85	85	=	171	90		53	53		89	89	
Namueto	6	6	=	10	10	=	21	15		1	1		11	11	
Linde	13	10	=	20	20	=	41	23		13	13		21	21	
Napupulo	17	10	-7	28	28	=	56	30							
Nropa	7	7	=	11	11	=	23	15							
Mirate	27	10	-17	43	43		86	45		27	27		45	45	
Namanhumbiri	15	7	-8	24	24		47	25		15	15		25	25	
Deposito	0	0		0	0		0	0		141	141		235	235	
Total	144	70	-74	230	230		461	256		255	255		435	435	
District de Namuno															
Melôco	22	8		35	35		69	30							
Papai	10	5		16	16		31	15		10	10		16	16	
Hucula	7	7		12	12		23	10		7	7		12	12	
Machoca	16	8		25	25		50	25		16	16		26	26	
Ncumpe	22	10		35	35		71	30		22	22		37	37	
Nanrapa	10	5		16	16		32	15		10	10		17	17	
Namuno	52	15		84	84		168	65		45	45		75	75	
Total	139	58		222	222		445	190		110	110		183	183	
Grand Total	381	177	-204	610	610	=	1222	636	-586	514	514	=	864	864	=

Est = Nbr of Vials per Forecast

Dist = Nbr of Vials actually distributed

Status = Situation between forecast and distribution