

**VillageReach**

# Vaccine Coverage and Vaccine and Rapid Diagnosis Tests Logistics Study Niassa

Baseline Survey. July 2010

## Contents

Executive Summary.....	5
1. Introduction.....	7
2. Objective of the survey.....	7
<b>3. Methodology</b> .....	7
3.1. Sample size and framework.....	7
3.2. Ethics Approval .....	9
3.3. Training for the survey.....	9
3.4. Data analysis .....	10
3.5. Presentation of the results. ....	10
4. Demographic data. ....	11
4.1. Sex of respondents to the household survey.....	11
4.2. Household Size .....	11
4.3. Educational Levels of Mothers/Guardians.....	12
4.4. Housing and living conditions .....	12
5. Vaccine Coverage .....	14
5.1. <i>Definitions of Vaccination Status</i> .....	14
5.4. Location for vaccination (including children over 12 months of age) .....	17
5.5. Compliance with vaccination calendar. ....	18
5.7. Reasons for non immunization .....	21
6. Access to Vaccine Services .....	22
6.1. Distance to Health centre used for Vaccination .....	22
6.4. Changes in the Quality of the Health System Offered in the last five years .....	24
7. Discussion points relating to vaccine coverage and access to health services .....	24
7.1. Vaccine Coverage Rates .....	24
7.2. Vaccine Education and Sensitization Programmes .....	25
8. Cold Chain System and Health Staff Performance .....	25
8.1. Interviews with health staff on cold chain management .....	25
8.1. Management of Vaccine Stocks.....	25
9. Rapid Diagnosis Tests. ....	28
9.1. Use of Rapid Diagnostic Tests (RDT) .....	28
9.2. Management of stocks of RDTs .....	29
9.3. <i>Planning for reducing stock shortages</i> .....	30
9.4. Disposal of expired or damaged RDTs .....	32
9.5. Re-stocking strategy.....	32
10. Essential Cold Chain Equipment .....	32
10.1. Fridge management.....	32
10.3. Temperature control.....	35
10.4. Health worker Experience.....	36
11. Conclusions and Key Observations .....	36
Maputo.....	37
November 2010. References .....	37
References .....	38

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Annex 1. Detailed Tables of Results (attached under separate cover)Annex 2. Community Leaders Interview List .....	39
Annex 1. Detailed Tables of Results (attached under separate cover)Annex 2. Community Leaders Interview List .....	39
Annex 2. Community Leaders Interview List .....	40

## Acronyms and Glossary of Terms

DPS	Provincial Health Department
DTP	Diphtheria-tetanus-pertussis
EPI	Expanded Immunization Programme
FDC	Fundação para o Desenvolvimento da Comunidade
HepB	Hepatitis B
MISAU	Ministry of Health
Polio	Oral vaccine against poliomyelitis
RDT	Rapid Diagnostic Tests
VAS	Vacina Anti-Sarampo (Measles)
VAT	Vacina Anti-Tétano (Tetanus)
VR	VillageReach
WHO	World Health Organization

## Executive Summary

A vaccine coverage survey and review of the logistics for cold chain management was carried out in July 2010 in six districts in Niassa province. The results of the survey will be used as a baseline to measure the success of the DPS and Village Reach intervention in the area of cold chain management. The survey sample consists of 602 household interviews (households with children between the ages of 12 months to 23 months) and 47 health facility interviews. The survey was undertaken in six districts. In each of the districts a sample of ten households and ten villages that were selected on a random basis using probability proportional to size. The sample is representative at the level of the districts covered under the survey.

The majority of people interviewed during the survey were female care givers (usually mothers of the children), of these over half of the women were illiterate. The average household size was 5.7, and the almost all of the households had access to farmland, indicative of agricultural livelihoods in the areas surveyed.

Malaria, diarrhea and bilharzia were all mentioned as common illnesses in the community, as well as female specific problems of frequent pregnancies and urinary tract infections. Typical male illnesses were identified as hernias and sexually transmitted infections. There were significant gaps in knowledge about the importance of vaccinations; community leaders suggested the active inclusion of men as a potential strategy for increasing adherence to vaccination and testing.

Of the children participating in the 2010 survey, nearly all have health cards (92.3%). The rate, for the six districts, for children fully vaccinated is 64% (including all children below 24 months and including data provided by mothers but not verified on the health card). The rate of children fully immunized is extremely low for the six participating districts, standing at less than a quarter of eligible children fully immunized under the age of one year (23.9 %). If the children immunized above 12 months of age are included (data from health card only) the rate increases to just over a third of children (37.3%). The results obtained at district level are statistically significant. The district with the lowest vaccination coverage rate is Mavago district with only just over a tenth of children fully immunized (13.9%); followed by Lichinga district (15%) and the district of Cuamba (18.8%). The highest levels of fully immunized children is in Lichinga City (45%) but is still a poor result for the capital of province, with less than 50% of children fully immunized

Children are generally vaccinated in a health facility (88.6%), the remaining ten percent of households received vaccinations through mobile clinics. In general, vaccines are administered late; there are significant differences between the districts in terms of compliance to the vaccine calendar. Consistently the district of Lichinga and Mecula show patterns of late administration of vaccines.

The majority of people interviewed had heard about vaccines (88.7%), but only a third (32.9%) were aware of the reason for vaccinating children. A quarter of all respondents (24.8%) stated that they did not have information about vaccines. The majority of people heard about vaccination from the health services (77.6%) of which 60% heard from the health workers in the health facilities and 17% heard from the mobile clinics.

The majority of people walk to the health centre (92.8%) and over a half of the people take under an hour to reach the health facility (58%). In the districts of Mecula, Cuamba and Nipepe the distances

travelled are further with 35% of people in Mecula taking over two hours to reach a health facility, a third of people in Cuamba (33%) and for Nipepe (27.9%). Over a third of respondents (40.2%) stated that they had failed to receive a vaccine for their child while visiting a health centre. The reasons for not receiving the vaccination were various; over half of the respondents stated that when they visited the health centre there were no vaccines (56.6%); a tenth of respondents said that health workers were not present at the health facility.

At the time the survey was conducted just over half of the health workers (58.3%) stated that vaccinations were re-stocked on a monthly basis and three quarters of the health workers stated that there were stock-outs (73.9%). Over half (58.3%) of the respondents stated that, at the time of the interview, there was a lack of vaccines in the health facility. Health workers were asked about the procedures when they do not have vaccines in stock (outside of normal delivery mechanisms). 15% had a passive attitude, stating that they would wait for the vaccines to arrive; less than half of the interviewees (45%) stated that would fetch vaccines and 40% stated they would inform the head of department about the stock out.

The majority of health workers are familiar with, and had used, all of the Rapid Diagnostic Tests (RDTs) in their health facility. The lowest usage was registered for syphilis (76.9%). For HIV Determine, 92.3% of health workers had used the test, 92.3% had used Uni-Gold, and 96.2% had used the rapid malaria test. Eight health workers stated that testing of malaria and syphilis had not occurred at some point in the last three months due to stock outs of the RDTs, and four of the health workers stated that they had not carried out HIV tests due to a lack of the RDTs. In the last month 40% of the health facilities had run out of one or more of the RDTs; with a critical situation in Nipepe where all of the health facilities stated that they had had stock outs during this period. Well over half of the health facilities (59.3%) did not have systems for the control of the RDTs.

Most health facilities (96.2%) have fridges. Approximately half of the fridges are solar powered fridges (52%), followed paraffin fridges (36%); with a smaller number of electric fridges (12%). However, only three quarters of the fridges were functioning at the time of the survey (76%). The majority of fridges had temperature registration forms (91%), however, of those health facilities with registration forms only three quarters of the forms had been filled in (77%). Two thirds of the health facilities (63%) with temperature registration there had been no significant variation in temperature during the last month.

Some issues raised in the baseline:

- i. The VillageReach and DPS programme to strengthen the Child Immunization Cold Chain in the province of Niassa should learn from the successes of the Cabo Delgado initiative, and apply similar procedures to the cold chain management in Niassa.
- ii. The analysis clearly showed that there are missed opportunities for vaccination and eliminating these should be a priority in the first phase of the project.
- iii. Additional work on the information campaigns; good IEC material should be developed to clearly explain to care takers of children, not only the need for vaccination but the reason for vaccination. This will increase compliance and increase coverage
- iv. Given the low population density and the weak health facility network the intensification of the use of mobile clinics should be considered by the DPS and VillageReach in the first phase of the project.
- v. In the study it was shown that there is a serious stock management issue relating to the RDTs. Learning from the experience of improving the vaccine cold chain, the Dedicated Logistics Systems is well positioned to make similar improvements for RDTs.

## 1. Introduction

In November 2008 VillageReach published the results of a study that demonstrated considerable impact on the vaccination coverage rates in the province of Cabo Delgado, namely an increase from 68.9% in 2002 to a DPT-Hep B3 coverage rate of 92.8% in 2008 attributable to project activities jointly undertaken by DPS, VillageReach and FDC. There were also encouraging results in terms of cold chain management, staff supervision and management of medical supplies. The logistics system, called the Dedicated Logistic System, established in Cabo Delgado was 17% more efficient than the system operated in Niassa (where there were no project activities) mainly due to the increased coverage and more efficient use of resources.

Due to the success of the previous programme, DPS Niassa and VillageReach intend to establish the Dedicated Logistics System in the province of Niassa. The Dedicated Logistics System will continue to work on improving EPI but also include the logistics management of the Rapid Diagnostic Tests (RDTs) for HIV, Syphilis and Malaria that are now part of the national protocol for testing. The Dedicated Logistics System will concentrate on improving the vaccine distribution system and the distribution system for RDTs.

In order to measure the impact of the new initiative it is necessary to establish a baseline for the key indicators. The following report presents the results for Niassa province of the household vaccine coverage survey and results for the health facility and community leaders interviews.

## 2. Objective of the survey

The main objective of the survey is to provide baseline information to measure the impact of the Dedicated Logistics System in Niassa. The system will concentrate on improving logistics for the EPI and services offering Rapid Diagnostic Tests for malaria, syphilis and HIV. Baseline data<sup>1</sup> will be collected in 2010 and end-line data in 2013.

## 3. Methodology

### 3.1. Sample size and framework

The study used the methodology for conducting an immunization coverage cluster design study presented by the WHO in the Immunization Cluster Survey Reference Manual (WHO 2005) to obtain results that are significant at district level. The sample consists of 602 household interviews (households with children between the ages of 12 months to 23 months) and 47 health facility interviews. The survey was undertaken in six districts. In each of the districts a sample of ten households and ten villages that were selected on a random basis using

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<sup>1</sup> Findings presented in this report.

probability proportional to size. The sample is representative at the level of the districts covered under the survey. In each cluster, households with children between the ages of 12-23 months were chosen. Only those households that had at least one living child of 12 to 23 month-old and a caretaker or other household member 14 years or older who was knowledgeable about the child's vaccine status were eligible for interview. The selected household's child was not required to be present for the household to be included in the study. If there was more than one eligible child, the youngest child within the 12-23 month age range was chosen. No more than one child between the ages of 12 and 23 months was selected per household. A total of 602 children between the ages of 12 and 23 months were included in the study.

At the cluster level (village or *bairro*<sup>2</sup>) the households to be interviewed were selected in the following way:

- Step 1. The leader of the area was requested to take the team to the centre of the village/bairro.
- Step 2. On reaching the centre of the village/bairro the team spun a bottle on the ground and noted the direction that the bottle neck was pointing.
- Step 3. Then a note (money) was taken from a member of the team and the last number of the serial identification number of the note was selected. The number represents the first house to be selected. i.e. Number 5 on the note means the fifth house in the row.
- Step 4. Using the number from the note and walking in the direction indicated by the bottle, the team selects the first house to begin interviewing. For example, if "5" was the number on the note, the first house to be selected is the fifth house in the line of houses in the direction indicated by the bottle.
- Step 5. The next house to be selected is the nearest house to the first following the direction indicated by the bottle.
- Step 6. When the team reached the boundary of the village/bairro without interviewing all the necessary households, they turned to the nearest house on the left and continued with the selection, until reaching the requisite number of interviews for the cluster (children 12-23 months).

The following table illustrates the characteristics of the household sample. The total sample size for the vaccine coverage survey was 602 children between the age of 12 months and 23 months. The average age of the children participating in the survey is 19.3 months and, as in the Cabo Delgado survey, just under half of the sample was comprised of female children (46.6%). Six districts were covered in the survey.

**Table 1 General Characteristics of the Household Survey Sample**

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<sup>2</sup> Bairro – sub division of a city or town.

District	Sample size	% Female children	% that held vaccination cards	Average age in the child in months
Mavago	101	36.6	86.1	20.7
Lichinga district	100	52	84	20.3
Mecula	100	57	99	18.4
Lichinga City	100	41	98	18.9
Nipepe	100	46.5	91.1	18.4
Cuamba	101	46.5	95.1	19
Total	602	46.6	92.2	19.3

In addition to the household survey, a questionnaire was carried out with health staff responsible for the EPI. Forty seven health facility interviews were carried out in 41 health centres and 6 health posts. The health facilities represent the nearest health facility for the populations in the randomly selected clusters, and therefore provide additional information to interpret the vaccine coverage rates. The data presents descriptive statistics that are not statistically valid. The selection of the health facilities is dependent on the cluster sample, i.e. health facilities were not randomly selected from all health facilities in the province, but were selected according to proximity to the 60 clusters in the six districts. The quality of the data from the health facility interviews was not consistent, with many of the “fields” left with no data. This has led to a reduced number of observations in a number of variables. The number of variables is noted in the results tables and graphs. The main reason for the lack of responses was due to the interviewee not having sufficient knowledge to respond accurately to the questions asked.

In each of the communities visited community leaders were interviewed<sup>3</sup> about; the common illnesses for different demographic groups in the community; knowledge about vaccines and vaccine campaigns; access and use of health services

### 3.2. Ethics Approval

The MISAU Bioethics Committee and the Minister of Health granted approval for the baseline study.<sup>4</sup>

### 3.3. Training for the survey

The survey team was trained during four days by two experienced trainers. The training consisted of; presentation of the objectives of the survey; sessions on the vaccination calendar; classroom practice with the questionnaires; and field test training and feedback. Six teams of three enumerators and one supervisor were selected from the trainees. There were a number of challenges with the training due to the lack of experience of the enumerators and care was taken to ensure sufficient time for testing of the questionnaires in the field. However, the

<sup>3</sup> See list in Annex 2.

<sup>4</sup> See Protoco

quality of the data for the Niassa study was not as high as in the Cabo Delgado survey. In particular there were problems with the interviews with the health workers in the health facilities and a number of fields have a limited number of observations.

### *3.4. Data analysis*

Information from the questionnaires was double entered to reduce data entry error. Analysis was carried out in SPSS.

The household vaccine coverage survey sample is **statistically significant for the total sample (602)** and mean and median results are reported for the data. In addition, each of the district samples of 100 children between the ages of 12-23 months of age is statistically significant within the district and represents the coverage rates for the district.

The sample is a variation of the standard WHO designed cluster sample, taking 10 households x 10 clusters and the data is significant at both province and district level.

### *3.5. Presentation of the results.*

The findings and discussion are presented in the following order:

- i. Demographic data pertaining to the households of the children eligible for the survey, including; educational level of household head, housing and living conditions, and household livelihood information.
- ii. Vaccine Coverage including; definition of vaccine status, vaccine coverage for the province, vaccine coverage and sex of respondent, size of household and vaccine status, compliance with vaccine calendar, reasons for non immunization, discussion points for immunization programme.
- iii. Access to vaccine services, including; where households access vaccination services, distance to services offering vaccinations, use of health services, motives for non administration of vaccine when attending a health facility, and changes in the quality of care in the last five years.
- iv. Rapid Diagnosis Tests, including; use of RDTs, and management of supply chain.
- v. Cold Chain System and Health Staff Performance, including; status of stocks of vaccines, health staff morale, and logistics.
- vi. Essential Cold Chain Equipment, including; fridge management and transport issues.

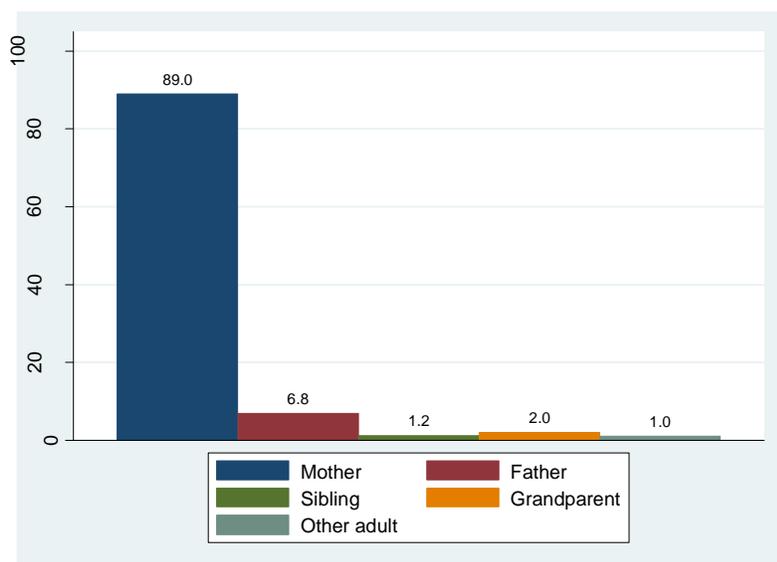
The results section is followed by a section for conclusions and key observations.

## 4. Demographic data.

### 4.1. Sex of respondents to the household survey

The majority of the people interviewed were women (91.4%). The high number of female interviewees was consistent across the districts with a range from the lowest of 87% female interviewees in Lichinga to the highest percentage of 95% in Nipepe. The majority of the people interviewed were the mothers of the children in question (89%), and only 6.8% were the fathers of the children (see graph 1 below).

**Graph 1. Relationship of child to the person interviewed. (%)**



Source. VillageReach DPS Coverage Survey Niassa. 2010

### 4.2. Household Size

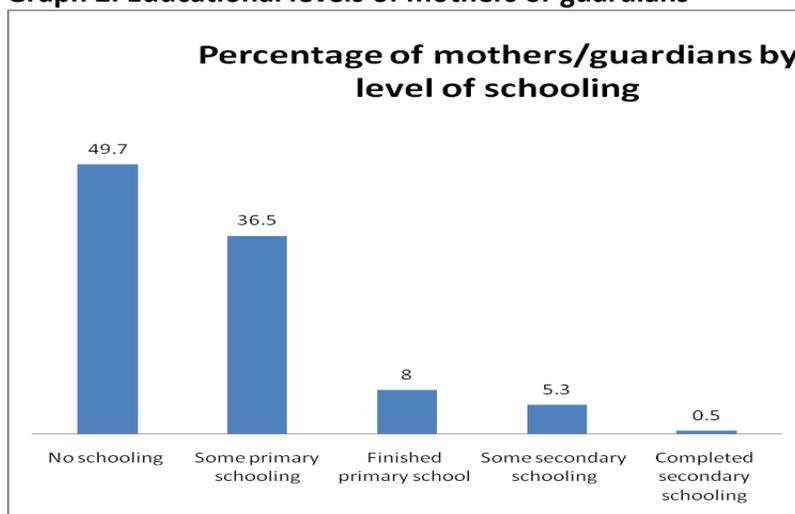
The average age of the people interviewed was nearly 27 years of age (268), with only slight variation across the districts, with Mavago at 30 years of age (30.4) and Nipepe with the youngest interviewees at 25 years of age (25.1). Average household size was 5.7 with 1.7 children under the age of two. Lichinga city has the largest family size (6.6) and the smallest average family size was in the district of Lichinga (5.2) This finding is consistent with the Cabo Delgado study where the household size in the city of Pemba was one of the highest (7.2) against the rural area of Namuno with only 4.8. The larger family sizes in the cities may be due to rural relatives sending children for schooling in the urban centres, such as Pemba in Cabo Delgado and Lichinga in Niassa. There are very low rates of female headed households (14.2), this is lower than the 25.1% in Cabo Delgado.

See table I in Annex 1 for details.

### 4.3. Educational Levels of Mothers/Guardians

Half of the mothers/guardians involved in the survey in Niassa have no formal education (49.7%) or only a few years of primary schooling (36.6%). The percentage of mothers/guardians with no education is higher than found in the Cabo Delgado study (40.3%). Only 8% mothers/guardians had completed primary school. The low levels of schooling present a major obstacle to development and improvement in the health status of children in the province. (See graph 2 below).

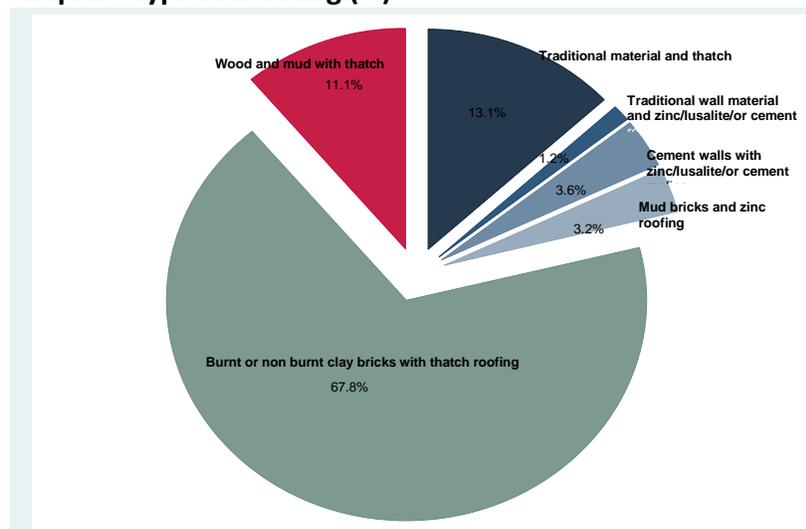
**Graph 2. Educational levels of mothers or guardians**



Source. VillageReach DPS Coverage Survey. Niassa 2010

### 4.4. Housing and living conditions

The following graph indicates that the majority of people in the survey live in homes made of bricks (fired or un-fired) with thatch roofing (67.8%).

**Graph 3 Type of Housing (%)**

Source. VillageReach DPS Coverage Survey Niassa 2010

#### 4.5 Household Livelihood Information

The overwhelming majority of households in the rural districts have farmland; ranging from 97% in Lichinga district to 95.1% in Cuamba. It was found that even in the city of Lichinga almost three quarters of households had farmland (74%). This contrasts with the capital city of Pemba where only a third of households had farmland (33.3%). The finding seems to point to the importance of farming in the province of Niassa, where the majority of urban dwellers still practice farming as part of their livelihood.

Very few households have livestock; just over a third of the households have chickens (35.2%) and only 8.3% own goats. None of the households interviewed had cattle. Over half of all households have radios (59.2) with high radio ownership in Mavago (76.3%) and Lichinga district (77.3%) and low ownership in Nipepe (40%). (See table II in annex 1.)

#### 4.5. Illness Profile<sup>5</sup>

The main illnesses identified by local leaders were;

- Malaria across all age groups and for both sexes
- Diarrhea across all ages and for both sexes.
- Bilharzia was frequently mentioned as a community problem

HIV and AIDS were mentioned on a number occasions but not seen as a major problem in the communities interviewed.

<sup>5</sup> Information provided by community leaders in each of the survey sites

In addition to the problems mentioned above:

- Specific health problems for women were issues linked to multiple pregnancies and lack of care was frequently mentioned as well as stomach pains and urinary tract infections. In one community the leaders mentioned goiter as a problem for women.<sup>6</sup>
- Men commonly suffered from hernias, swelling of legs and Sexually Transmitted Infections (STIs)
- Elderly people are seen to suffer from rheumatism, back pain and poor eye sight
- Children suffer from malaria, anemia, conjunctivas, and diarrhea. A number of leaders mentioned measles, chickenpox and epilepsy as illness that affect children,

The vast majority of the leaders stated that women in the community took their children to the health facility for vaccination. However, a significant proportion of the leaders said they did not think that the women were aware of the reasons for the vaccinations. The main source of information about vaccines are the health staff, both through visits to the health centres and through the out-reach work carried out in the community. A small number of leaders mentioned community meetings as a source of information on vaccinations and two mentioned NGOs. Views were expressed that men should be targeted in the dissemination campaigns as they may impede (or not encourage) spouses to take children for vaccination. The leaders themselves admitted that their knowledge was patchy about vaccinations with approximately a third with partial knowledge of the vaccines necessary for children, and the rest with no knowledge.

## 5. Vaccine Coverage

The main reason for conducting the survey was to establish a baseline for the Dedicated Logistics System in Niassa in the area of vaccine and cold chain management.

### 5.1. Definitions of Vaccination Status

Fig. 1. Definitions used for vaccination status

#### Definitions

“Vaccination status of child” was defined as follows:

Fully Immunized (1)	Received valid doses of all vaccinations before the age of 12 months. Criteria for receipt of valid doses of all vaccinations were: <ul style="list-style-type: none"> <li>• BCG vaccination verified by history plus scar, card</li> </ul>
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<sup>6</sup> Niassa has endemic iodine deficiency and goiter is a common problem in the mountainous regions of the province. Iodine deficiency also causes miscarriages and spontaneous abortion – this was also mentioned by the leaders as an issue for women.

	<p>plus scar, or card only;</p> <ul style="list-style-type: none"> <li>• all three polio vaccinations received a minimum of 28 days apart as verified on card;</li> <li>• all three DTP/HepB vaccines received a minimum of 28 days apart as verified on card; and,</li> <li>• measles vaccination received after 9 months of age as verified on card.</li> </ul>
Fully Immunized (2)	Receipt of BCG vaccination verified by history plus scar, card plus scar, or card only and all other vaccinations; and all other vaccinations as verified by card only, including children vaccinated > 12 months
Fully vaccinated	Receipt of BCG vaccination verified by history plus scar, card plus scar, or card only and all other vaccinations including children > 12 months; and all other vaccinations as verified by card or history
Partially-vaccinated child	Receipt of at least one of the vaccines according to the criteria described for “fully-vaccinated child.”
Non-vaccinated child	Not having received any of the vaccines according to the “fully-vaccinated child” criteria.
Vaccination failure	Children who qualify as partially- or non-vaccinated.

## 5.2. Vaccine coverage for the province

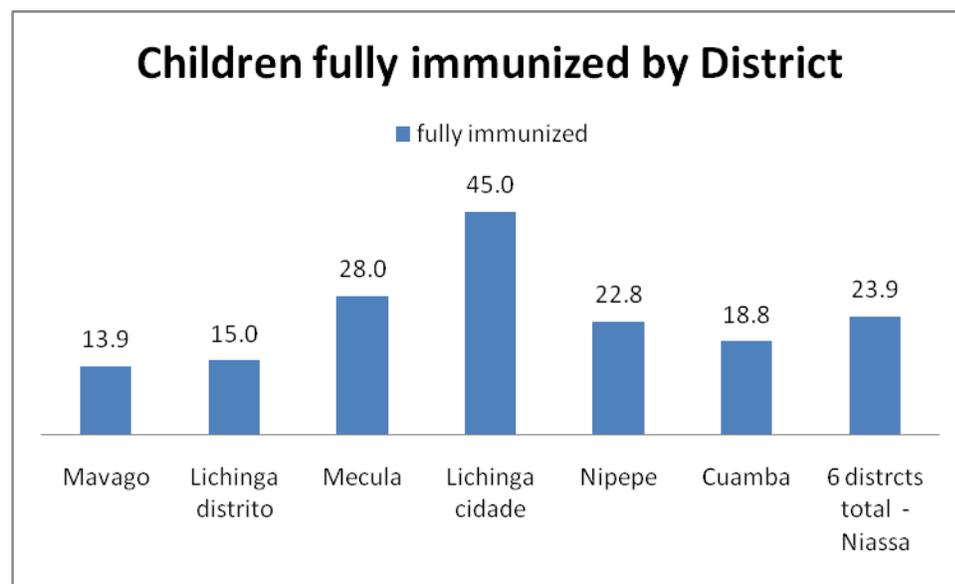
Of the children participating in the 2010 survey, the vast majority have health cards (92.3%). The vaccine coverage rate for the six districts for children fully vaccinated is 64% (including all children below 24 months and including data provided by mothers but not verified on the health card).

The rate of children fully immunized is extremely low for the six participating districts, standing at less than a quarter of eligible children fully immunized under the age of one year (23.9%). If the children immunized above 12 months of age are included (data from health card only) the rate increases to just over a third of children (37.3%), still a very disappointing result. Given the high levels of health cards – over 90% - it can be assumed that access to health services per se is less of an obstacle than the poor functioning of the vaccine service or a lack of adherence to the programme due to lack of information. This will be further explored in the report.

### 5.3. Vaccine coverage at district level

The results obtained at district level are statistically significant. The district with the lowest vaccination coverage rate is Mavago district with only just over a tenth of children immunized (13.9%); followed by Lichinga district (15%) and the district of Cuamba (18.8%). The highest levels of fully immunized children is in Lichinga City (45%) but is still a poor result for the capital of province, with less than 50% of children fully immunized.

**Graph 4. Percentage of Children Fully Immunized by District (less than 12 months of age)**

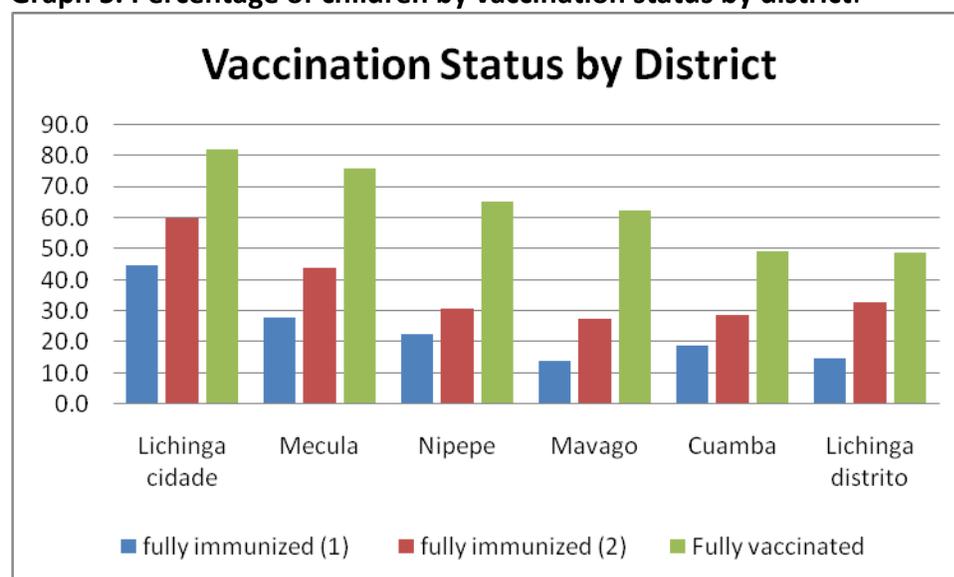


The graph and table below show that the city of Lichinga and the district of Mecula have the highest levels of coverage for all three vaccine status definitions.

Lichinga : fully immunized 1 (45%) fully immunized 2 (60%) and fully vaccinated (82%)

Mecula : fully immunized 1 (28%) fully immunized 2 (44%) and fully vaccinated (76%)

Lichinga district and Cuamba have poor results for all three definitions and represent a worrying situation for these districts.

**Graph 5. Percentage of children by vaccination status by district.**

Source. VillageReach DPS Coverage Survey Niassa 2010

**Table 2. Vaccination Status by District**

District	fully immunized (1)	fully immunized (2)	Fully vaccinated
Lichinga city	45.0	60.0	82.0
Mecula	28.0	44.0	76.0
Nipepe	22.8	30.7	65.4
Mavago	13.9	27.7	62.4
Cuamba	18.8	28.7	49.5
Lichinga dist	15.0	33.0	49.0
<b>Six districts Niassa</b>	<b>23.9</b>	<b>37.3</b>	<b>64.0</b>

#### 5.4. Location for vaccination (including children over 12 months of age)

The majority of children are vaccinated in a health facility (88.6%), the remaining ten percent of households received vaccinations through mobile clinics. The highest percentage of children vaccinated through mobile clinics was found in the district of Lichinga (22.3%).<sup>77</sup> Less than one percent of all respondents stated that the children were vaccinated during the vaccination campaigns (0.9%).

<sup>77</sup> As previously noted the district of Lichinga has the lowest overall rate of vaccination coverage in the Province. The finding on mobile clinic usage may point to additional efforts made by the DPS to reach populations in the district that are not accessing the fixed health facilities.

5.5. Compliance with vaccination calendar.

**Fig. 2. Vaccine Calendar for Infant Immunization- Mozambique**

<b>Vaccine Calendar</b>	
Birth	BCG and Polio0
2 months	Polio1 and DPT-HepB1
3 months	Polio2 and DPT-HepB2
4 months	Polio3 and DPT –HepB3
9 months	Measles

Source. Ministry of Health. Mozambique

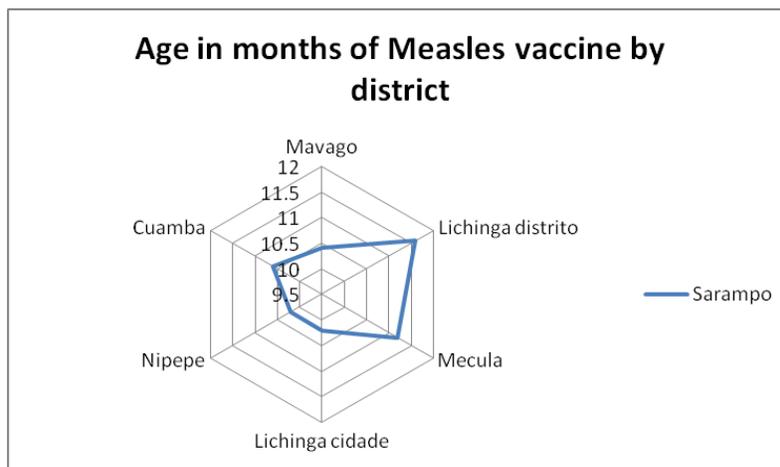
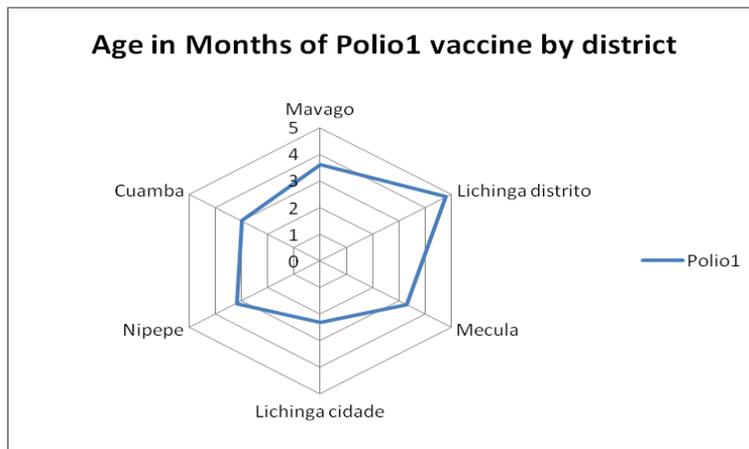
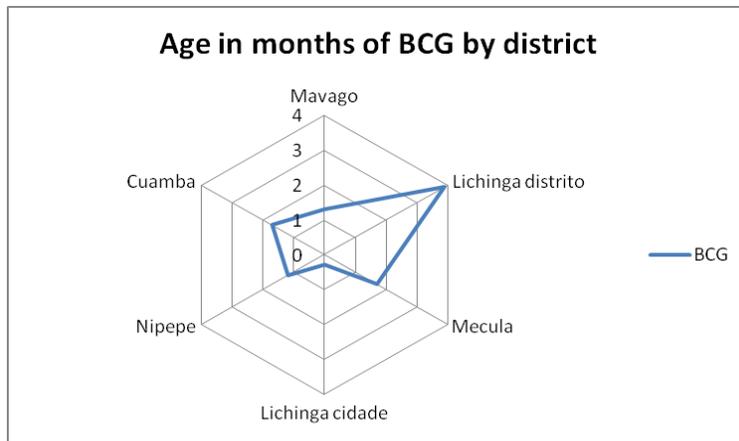
**Table 4. Average age in months of children when they receive each type of vaccination**

District	Months						
	Vaccine Calendar	Lichinga city	Mavago	Nipepe	Cuamba	Mecula	Lichinga district
BCG	0	0.3	0.9	1.2	1.7	1.9	3.9
Polio1	2	2.3	3.4	3.2	3.0	3.5	4.8
Polio2	3	4.3	5.1	4.8	5.3	5.7	7.4
Polio3	4	5.9	7.2	6.2	7.1	7.5	8.9
DTP1	2	2.3	3.4	3.1	3.5	3.3	4.8
DTP2	3	4.2	5.1	4.8	5.1	5.3	7.5
DTP3	4	5.8	7.1	6.4	7.2	7.7	9.3
Sarampo	9	10.2	10.3	10.2	10.6	11.3	11.6

In general, vaccines are administered late; there are significant differences between the districts in terms of compliance to the vaccine calendar. The table above provides details of the average age for each of the vaccines by district. As can be seen vaccine compliance is closest to the vaccine calendar in Lichinga city; this is also reflected in the higher rate of fully immunized under 12 months (1) of 45% in Lichinga city against 15% in Lichinga District). However, even in the capital of the province, the older the infant the more likely slippage is to occur in relation to the vaccine calendar. For example in Lichinga city, on average infants receive their first vaccination within 10 days of birth (0.3 months) but by the end of the vaccination schedule the anti-measles vaccination is administered, on average, over a month late. At the opposite end of the scale Lichinga district shows consistently late vaccination and subsequent low coverage rates; children on average are four months old before they are vaccinated for BCG, and eleven and a half months old when they receive the anti-measles vaccine. As seen from previous sections Lichinga district also has the lowest overall vaccination coverage. The gap between birth and the first vaccination is indicative of extremely low rates of births in health facilities.

The “spider charts” show patterns of late vaccination for a selection of the vaccinations, namely, BCG, polio 1 and Measles, and clearly illustrate the patterns describes above. Consistent patterns for age of vaccines in months would produce a regular hexagon, rather than the distorted shape presented in the graphs below.

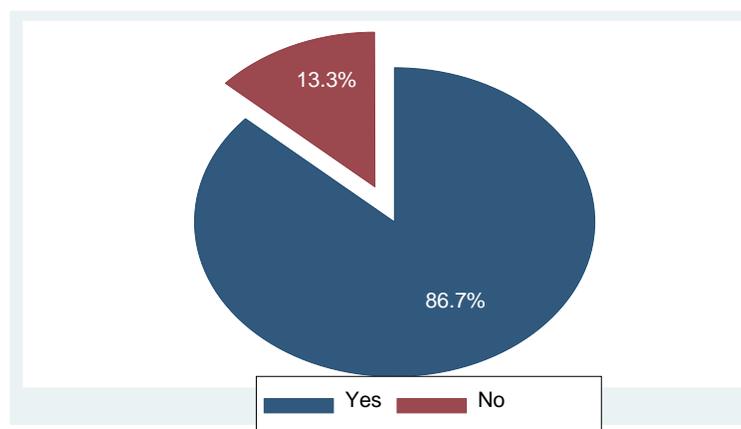
#### **Graphs 6. Age in months for infants to receive selected vaccines (BCG, Polio 1 and Anti-measles)**



### BCG Verification and Polio Protection.

The majority of children (86.7%) had a verifiable vaccination scar for the BCG (protection against Tuberculosis). See graph 7 below. However, as can be seen from the “Spider charts” above the BCG vaccine is administered very late in the districts. Specifically, the BCG vaccine is administered late in the districts of Lichinga District and Mecula. Polio 1 and measles vaccines follow similar patterns; with all districts administering the vaccines later than the MoH schedule, and Lichinga District and Mecula demonstrate extremely late administration of all the vaccines.

**Graph 7. Percentage of children immunized against tuberculosis (BCG) with scar.**



Source. VillageReach DPS Coverage Survey Niassa 2010

#### 5.7. Reasons for non immunization

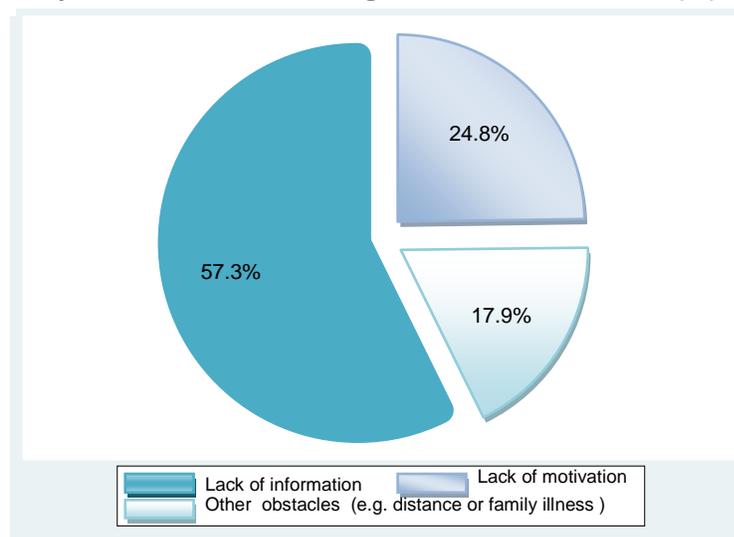
The majority of people interviewed had heard about vaccines (88.7%), but only a third (32.9%) were aware of the reason for vaccinating children. A quarter of all respondents (24.8%) stated that they did not have information about vaccines. This contrasts sharply to Cabo Delgado where less than 5% of mothers stated that they did not have any information about vaccination (4.3%). This generalized lack of understanding of the importance of childhood immunization may have a bearing on the low levels of vaccination in the province. There are startling differences between the districts in terms of understanding the need for vaccines; in Nipepe for example less than a tenth of the people interviewed are aware of the need for vaccination (8.8%).

In Niassa, the majority of people heard about vaccination from the health services (77.6%) of which 60% heard from the health workers in the health facilities and 17% heard from the mobile clinics. Less than a tenth of people heard about vaccines from community leaders; this is in contrast to the findings in Cabo Delgado where almost a fifth of all respondents heard about vaccines from local leaders. In conclusion, the majority of people still receive information from the health services, and community leaders appear to play a lesser role in terms of information

dissemination in Niassa, compared to the significant role they play in Cabo Delgado . See table III in Annex

Other obstacles that were cited by the respondents were linked to distance to the health posts and family problems that prevented them from going to the health post. Nearly a fifth of respondents indicated a lack of motivation. This is most probably linked to the lack of information about why vaccinations are important (see following section where three quarters of mothers do not know the reasons for vaccinating their children).

**Graph 8: Reasons for Failing to vaccinate the child (%)**



## 6. Access to Vaccine Services

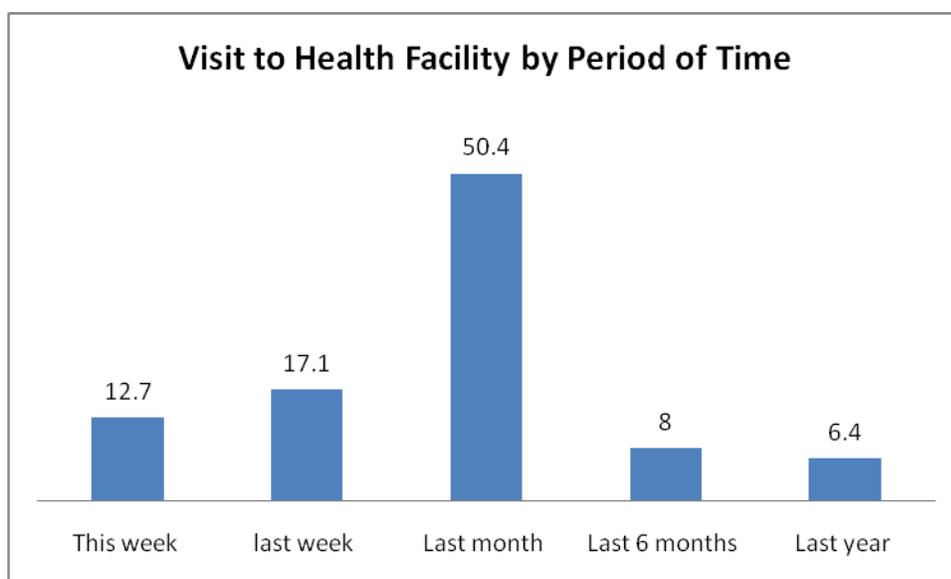
### 6.1. Distance to Health centre used for Vaccination

The majority of people walk to the health centre (92.8%) and over a half of the people take under an hour to reach the health facility (58%). In the districts of Mecula, Cuamba and Nipepe the distances travelled are further with 35% of people in Mecula taking over two hours to reach a health facility, a third of people in Cuamba (33%) and for Nipepe (27.9%). Only one person in the survey stated that they used a car to reach the health facility (Lichinga City) . The other means of transport was the bicycle, however, rates of bicycle use are low (6.2%). Bicycles tend to be owned by men in Niassa and as seen previously women generally take the children to the health facilities and were the majority of respondents in this survey.

## 6.2. Accessing and Use of Health Care Services

Households make frequent visits to the health facilities with the majority of households having visited a health centre within the last month (80.2%). This data of health centre usages tallies very closely with the data from Cabo Delgado (78.2%) See graph 10 below for more details.

**Graph 10. Percentage of households that visited a health centre by different time periods.**



Source. Vaccine Coverage Survey. Niassa. 2010

The main reason (52.2%) for visiting the health centre was to attend growth monitoring sessions; this was consistently high over the majority of districts with the exception of Cuamba where only a third (37%) of respondents stated that this was the motive for going to the health facility. The second most important reason for going to the health facility was because a child was sick (17.9%), followed by non specific out-patient appointments (14.3%).

## 6.3. Motives for Failing to Receive Vaccination (on visiting a health centre); lost opportunities.

Over a third of respondents (40.2%) stated that they had failed to receive a vaccine for their child while visiting a health centre. The reasons for not receiving the vaccination were various; over half of the respondents stated that when they visited the health centre there were no vaccines (56.6%); a tenth of respondents said that health workers were not present at the health facility; and the other reasons for failing to receive vaccines were non specific - 11% stated they didn't know why they hadn't been offered vaccines; 12% classified as "other" reasons. The findings point to major failings in the vaccine cold chain as well as issues linked to the lack of personnel in the health facilities. . See Table IV in the annex for details.

It is interesting to note that the districts with the lowest levels of vaccination, Lichinga District and Cuamba, also have the highest levels of lost opportunities (presenting at the health facility and not receiving vaccination), and are also the vaccine store locations for the province.

### **Fig 2. Missed Opportunities result in Low Coverage Rates in Lichinga District and Cuamba**

In Lichinga district well over half of all respondents stated that they went to the health facility and didn't receive vaccines (57.3%). Of which a quarter (24.1%) stated that the health workers were not present and over half (53.7%) responded that the vaccine were not available.

In Cuamba a similar percentage of respondents reported missed opportunities (59.6%), however, the overwhelming reason for not receiving vaccines in the case of Cuamba, was the lack of vaccines in the health centre (83.9%).

## **6.4. Changes in the Quality of the Health System Offered in the last six years**

The majority of people feel that there has been an improvement in health services in the last six years, with an improvement in both the access to health facilities, the number of staff in the health facilities and the accessibility of medicines.

The interviews with the community leaders had the following suggestions for the improvement of the health service.

- Expand the health facilities to improve the buildings, and in particular consider expanding the maternity units
- Ensure the supply of basic medicines
- Increase the number of staff, and improve the service that the staff provide
- Increase the number of mobile clinics

## **7. Discussion points relating to vaccine coverage and access to health services**

### *7.1. Vaccine Coverage Rates*

The vaccine coverage rate in Niassa is low, with a systematic tendency for the late application of vaccines in all districts. The districts of Lichinga and Cuamba have extremely low vaccine coverage rates, characterized by late application of vaccines and high rates of missed opportunities; people have gone to the health facilities but have not received vaccines for a variety of reasons. The main reason for not receiving a vaccination was lack of stock in the health facility, followed by a lack of health staff. As with the study in Cabo Delgado, it is extremely important to carry out more detailed work on the late vaccine schedule to identify all the reasons and find solutions. The introduction of the Dedicated Logistics System in Niassa is designed to improve the management of the cold chain to ensure there are valid vaccines within the system to satisfy the demand. Issues linked to the number of health staff in the

health facilities need to be discussed both at district and provincial level to guarantee that the Expanded Programme on Immunization continues to be a priority within the health sector.

### *7.2. Vaccine Education and Sensitization Programmes*

Level of knowledge about the reasons for, and the importance of, childhood immunization is low in Niassa, and may be one of the reasons for low adherence to the programme. People are using health services and there is a high coverage of health cards (indicative of use of Mother and Child Health Services) so although there are long distances travelled to reach a health facility this does not appear to be a major impediment. Health workers are still the main source of information about vaccines. The DPS and partners should explore mechanisms to disseminate and educate about the importance of the immunization programme using other mechanisms – for example– radio, schools or community meetings. In Cabo Delgado one of the main sources of information were the local leaders, this may be an alternative avenue to explore; educating and sensitizing influential people in the community about the importance of vaccine adherence.

## **8. Cold Chain System and Health Staff Performance**

### *8.1. Interviews with health staff on cold chain management*

The next set of results was obtained from interviews with health personnel (47). Interviews were carried out with health staff in all of the districts visited. A total of 47 interviews were carried out in health posts (12.5% of sample) and health centres (87.5% of sample). These findings are indicative of tendencies and are not statistically significant<sup>88</sup>. They do, however, provide interesting information to support the launching of the Dedicated Logistics System, and will provide a basis for comparison after three years. It should be remembered that the quality of the information obtained was not high and there was a lack of information in many of the data fields. The number of observations are indicated in the graphs and tables.

### *8.1. Management of Vaccine Stocks*

At the time the survey was conducted just over half of the health workers (58.3%) stated that vaccinations were re-stocked on a monthly basis. This is considerably lower than the findings for Cabo Delgado where the vast majority of health facilities were re-stocked on a monthly basis (96%). Given this situation, not surprisingly, three quarters of the health workers stated that there were stock-outs (73.9%) and over half (58.3%) stated that at the time of the interview there was a lack of vaccines in the health facility.

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<sup>88</sup> See methodology section for explanation of statistical significance. In addition to the non random nature of the sampling for this section, the Niassa questionnaires were poorly administered and there are a number of missing values in sub set of questionnaires.

**Table 3. Stock out of vaccines by type of vaccine and health facility.**

Stock out by type of vaccine	Health post	Health Centre	Total
BCG	0	46.2	40
Pentavalente	50	61.5	60
Anti Polio	0	69.2	60
Anti Measles	0	38.5	33.3
Anti Tetanus	0	46.2	40

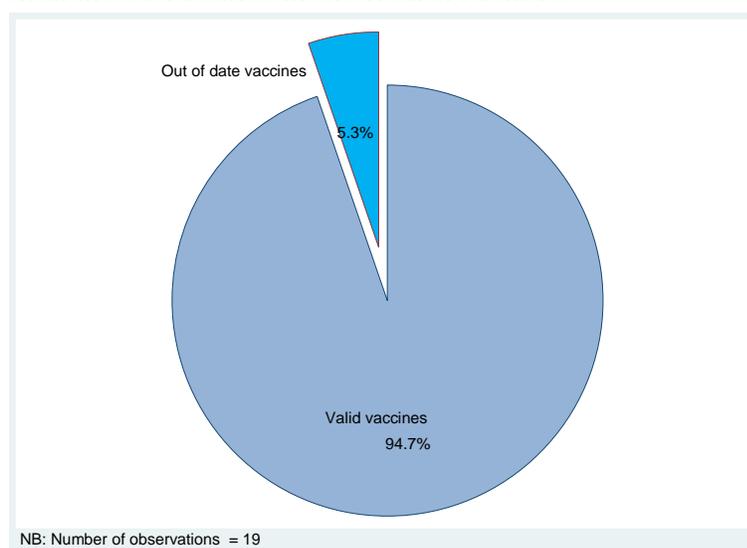
As can be seen from the preceding tables; 60% of health facilities had stock outs of Pentavalente and Anti Polio and 40% had stock outs of BCG and Anti Tetanus. These are worrying statistics and support the findings from the household interviews that lack of vaccines are the main reasons for “missed opportunities” when mothers seek vaccines at the health facilities.

### Stock out of Vaccines by District

All districts suffered from a lack of Pentavalente in the last 30 days. There were also stock outs of; BCG in Mecula, Niipepe and Cuamba; Anti Polio in Mecula, Lichinga city, Niipepe and Cuamba; Measles in Mecula, Niipepe and Cuamba; Anti Tetanus in Mavago, Mecula, Niipepe and Cuamba.

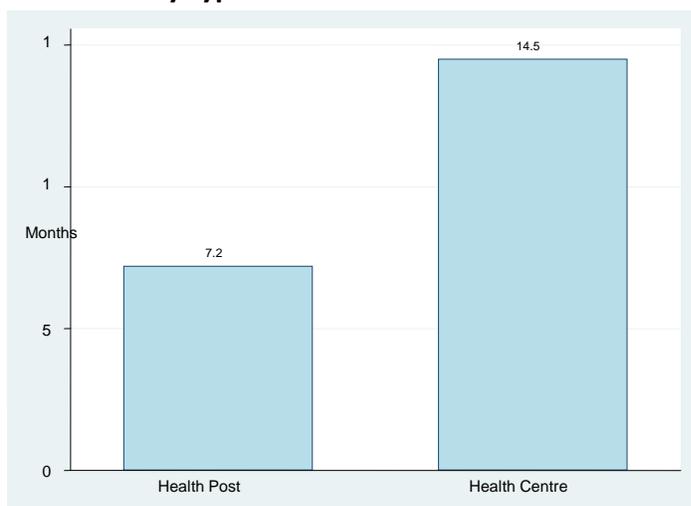
Mecula, Niipepe and Cuamba had stock outs of all vaccines in the last 30 days. It is interesting to note, that although Lichinga district has the lowest vaccine coverage rate they only suffered from stock outs of Pentavalente in the last 30 days.

### Shelf life of Vaccines in the Health Facilities

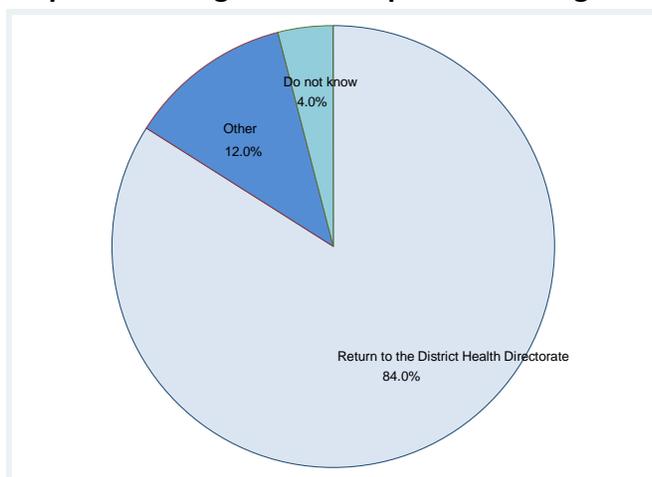


The majority of vaccines in the health facilities were not expired (94.7%) which indicates that the vaccines at health facility level are managed correctly in regards to expiry dates. As noted in the Cabo Delgado study the “time to expiry” differs between the different levels of the health system. For Health Posts (lowest level of the health system) the time to expiry of the vaccines is half of the time to expiry at Health Centre level (7 months and 14.5 months respectively). This implies that at the lowest level of the health system re stocking systems need to be extremely effective in order to maintain valid vaccines available to populations in the more remote rural areas. The turnover for the vaccines needs to be rapid at the lower levels of the health system.

**Graph 11. Average number of months to vaccine expiry date (from date of interview) by health facility type**



**Graph 12. Management of expired or damaged vaccines**

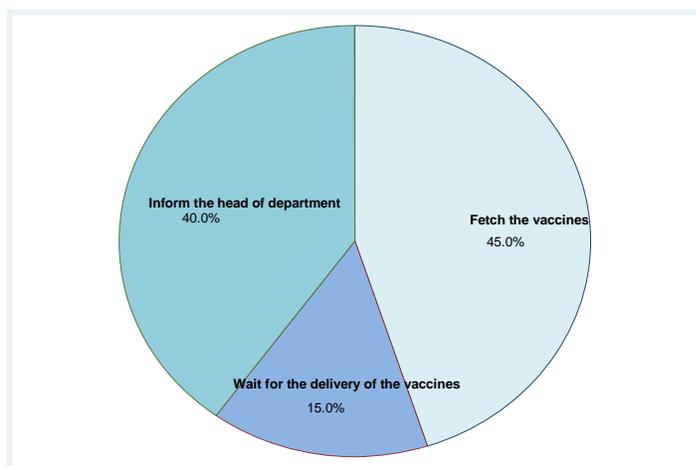


When questioned about the management of vaccines that have expired or are damaged, the majority stated that they were returned to the District Health Directorate (84%). The norm for

vaccination is that they should be returned in order to improve stock control and safe disposal; this appears to be the case in the majority of health facilities in the six districts surveyed.

Health workers were asked about the procedures when they do not have vaccines in stock (outside of normal delivery mechanisms). 15% had a passive attitude, stating that they would wait for the vaccines to arrive; less than half of the interviewees (45%) stated that they would fetch vaccines and 40% stated they would inform the head of department about the stock out.

**Graph 13. Response to Stock Outs of Vaccines (%)**



Given that monthly re-stocking is not the norm all of the health facilities in the study, and that there is a large proportion of stock-outs in the system, the tactics used by the health workers (waiting for delivery or informing the head of department – 55% of cases) does not appear to be effective.

## 9. Rapid Diagnosis Tests.

There is an option to expand the Dedicated Logistics System to include the management of the Rapid Diagnostic Tests (RDT) for syphilis, malaria and HIV (Test names: HIV Determine and HIV Uni-Gold). The tests for syphilis and HIV are now part of the national protocol for the identification and treatment of sexually transmitted diseases and are an extremely important addition to primary health care in the country. Rapid tests for the identification of malaria are increasingly used in health facilities, including those without laboratories to appropriately identify cases of malaria.

### 9.1. Use of Rapid Diagnostic Tests (RDT)

The majority of health workers are familiar with, and had used, all of the RDTs in their health facility. The lowest usage was registered for syphilis (76.9%). For HIV Determine, 92.3% of

health workers had used the test, 92.3% had used Uni-Gold, and 96.2% had used the rapid malaria test.

**Table 4. Percentage of Health Facilities that have used RDTs**

	<b>RDT</b>	<b>Yes</b>
<b>Use of RDTs in the health facility</b>	HIV Determine	92.3
	HIV Uni-gold	92.3
	Malaria	96.2
	Syphilis	76.9
	Others	34.6

### *9.2. Management of stocks of RDTs*

Just over half of the staff (57.7%) stated that RDT were re-stocked on a monthly basis. More of the health facilities received monthly stocks of malaria RDT (76.9%) than the other RDTs. This finding indicates that just under half of the health facilities do not receive regular (monthly) stocking of the RDTs. The result of the irregular stocking is that at the time of the study 11.5% of the health facilities did not have stocks of HIV Determine or Uni-Gold; 14.5% did not have stocks of Malaria RDT; and just over a quarter did not have stocks of syphilis tests (25.9%).

**Table 5. Percentage of Health Facilities that stock RDTs on a monthly basis by type of RDT**

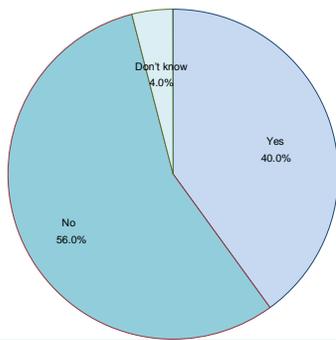
	<b>RDT</b>	<b>Yes</b>	<b>No</b>
<b>Monthly re-stocking of the RDTs</b>	HIV Determine	57.7	34.6
	HIV Uni-gold	57.7	34.6
	Malaria	76.9	19.2
	Syphilis	53.9	38.5

### **Valid RDTs in the Health Facilities**

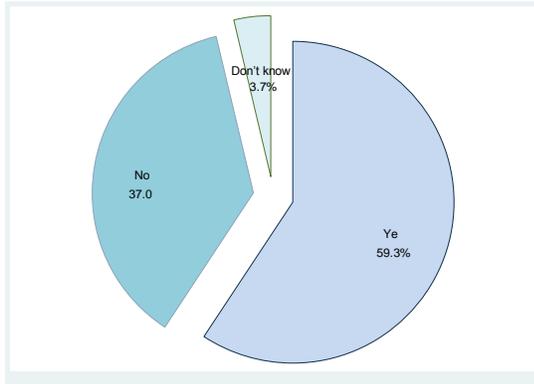
The health facilities that have stocks of RDTs are managing the expiry date efficiently (see graph 14 below), with the exception of the HIV Determine where a third of the stock was out of date. For HIV Uni-Gold, Malaria and Syphilis RDTs the majority of health facilities had the majority of stock within the expiry period.



**Graph 15. Percentage of Health Facilities with RDT Stock outs in the last month**

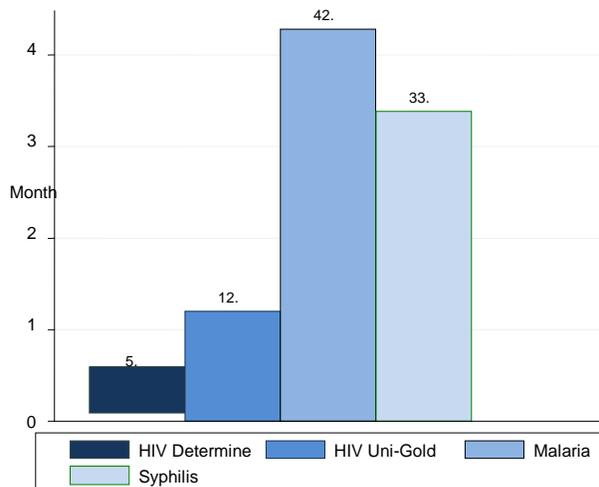


**Graph 16. Percentage of Health Facilities that had stock outs of RDTs in the last three months**



This reflects serious problems with the supply chain that are manifested at health facility level. The breaks in the supply chain will need to be investigated in order to improve the service. For the health facilities with the RDTs in stock, the majority had RDTs with valid use-by dates; the average time to expiry date varied from test to test; HIV Uni–Gold 12 months; HIV Determine 5 months; Syphilis 38 months; and malaria 42 months. See graph xxx below.

**Graph 17. Average length of time to expiry date (from day of interview) in months of the RDTs by test type.**



There is considerable work to be carried out both with the logistics systems of the vaccine management and the management of the RDTs in order to ensure a full service for communities in Niassa. With the experience gained by Village Reach working in Nampula and Cabo Delgado it should be possible to make in-roads into the problem and improve the service within the next few years.

### **Wastage of RDTs (Out of date tests)**

A tenth of the health facilities reported that they had not used RDTs because they had expired. Although this percentage is not high it does represent 10% wastage of the tests.

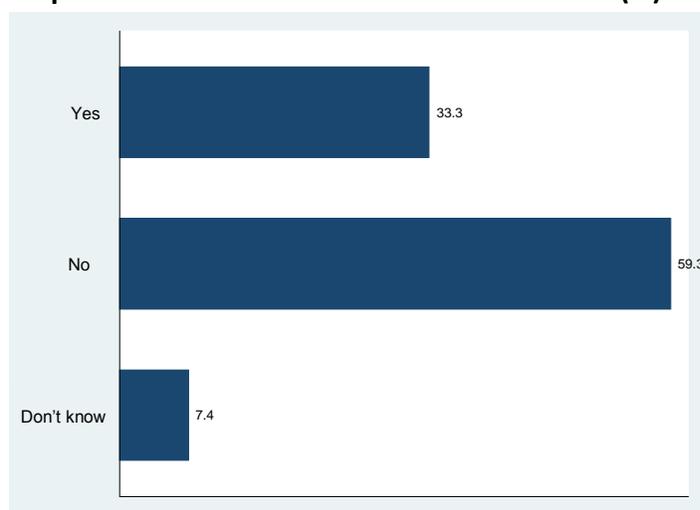
### **9.4. Disposal of expired or damaged RDTs**

Three quarters of the respondents stated that the unusable tests were returned to the district warehouse (73.1%).

### **9.5. Re-stocking strategy**

Well over half of the health facilities (59.3%) did not have systems for the control of the RDTs. This is high: the result is evident in the stock-outs found in all of the health facilities.

**Graph 18. Facilities with a stock card for RDTs (%)**



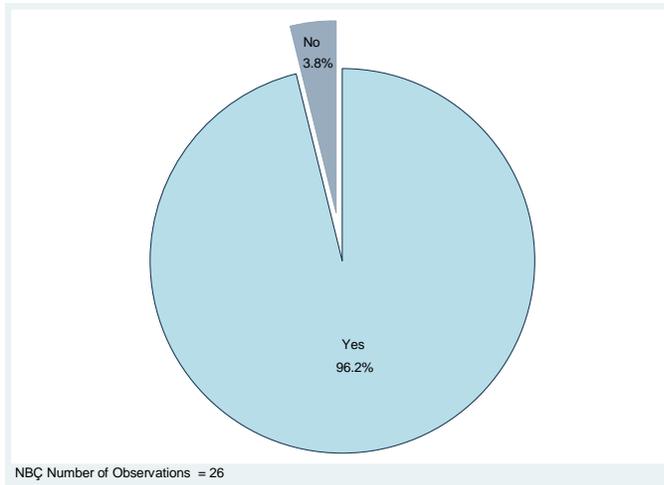
## **10. Essential Cold Chain Equipment**

### **10.1. Fridge management**

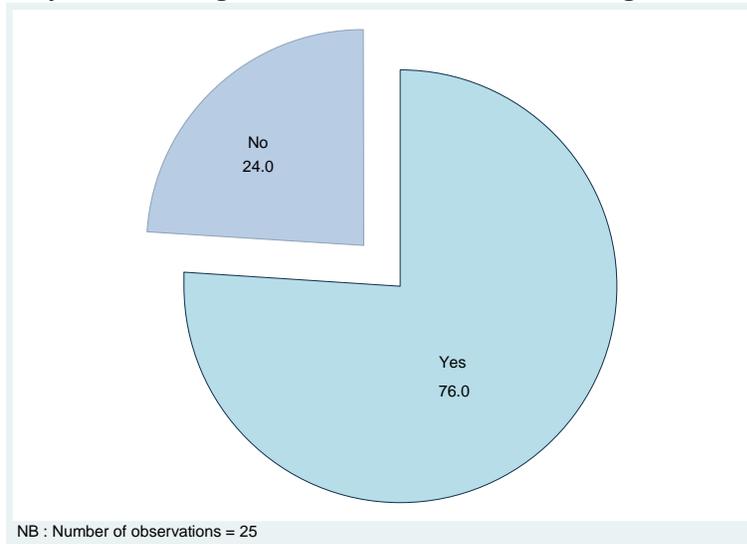
The majority of the health facilities (96.2%) have fridges. Approximately half of the fridges are solar powered fridges (52%), followed paraffin fridges (36%); with a smaller number of electric fridges (12%). However, only three quarters of the fridges were functioning at the time of the

survey (76%). The problems with the fridges had mainly occurred in the month preceding the survey.

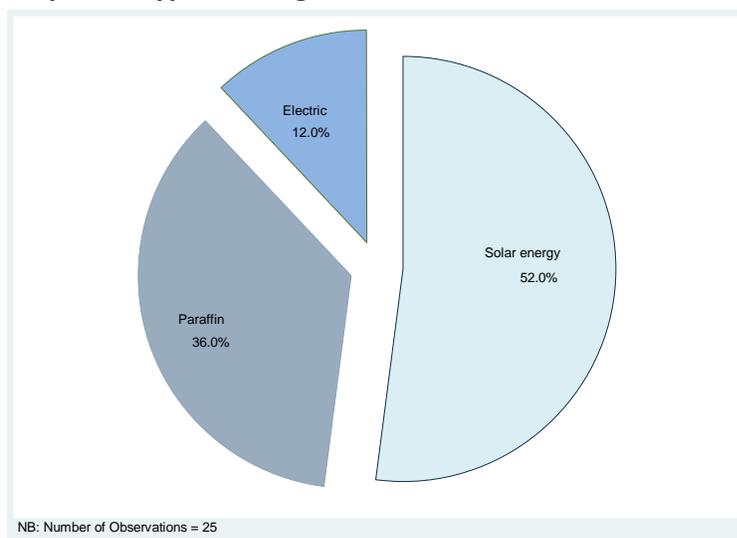
**Graph 19. Health facilities with fridges for vaccine storage.**



**Graph. Percentage of Health Facilities with Fridges that are functioning**

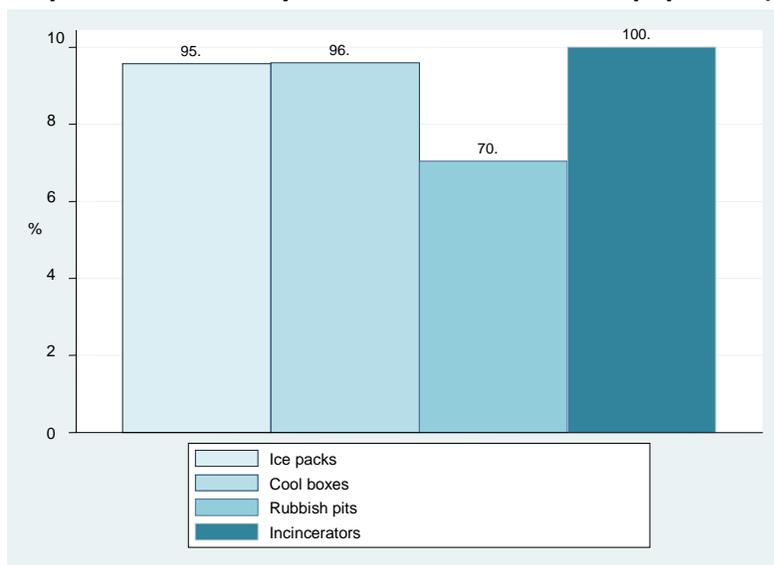


**Graph 20. Type of Fridge in the Health Facilities**

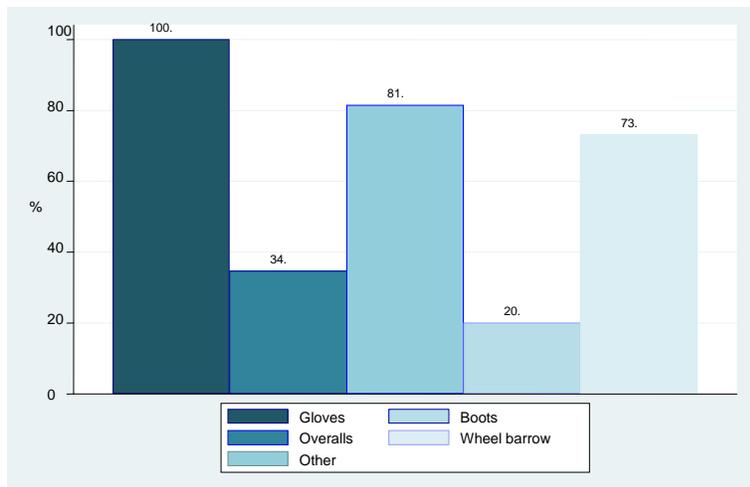


In addition to fridges, the health workers were asked if they had cold boxes, ice packs, rubbish pits and incinerators. The results are encouraging with the vast majority of respondents stating that they had all the above equipment. All health facilities incinerators (100%) and 70% had rubbish pits, and over 90% had both cold boxes (95.7%) and ice packs (96%). See graph 21 below. In terms of disposable equipment, all of the health facilities (100%) have gloves, but only a third had overalls (34%) or boots (20%).

**Graph. 21. Availability of Essential Cold Chain Equipment.(%)**



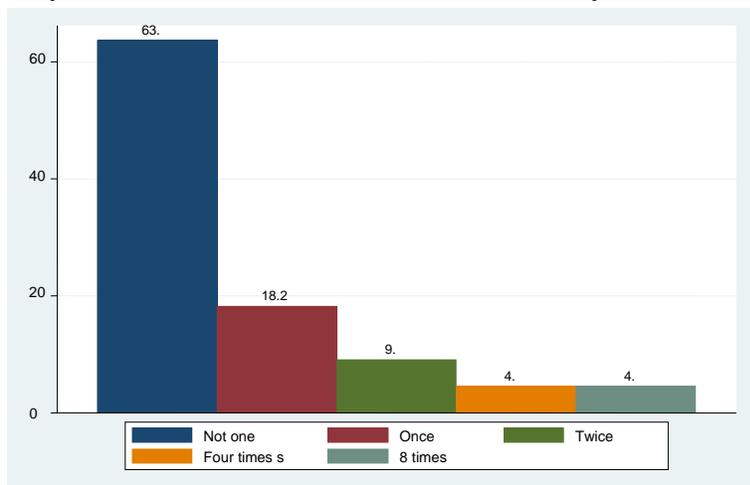
**Graph 22. Percentage of Health Facilities with disposable hygiene and working equipment**



### 10.3. Temperature control

Three measures of temperature control were observed in the health facilities, namely; instructions for fridge management; forms for registering twice daily temperature of the fridge; and the temperature of the fridge on the day of the observation. For two thirds of the health facilities (63%) there had been no significant variation in temperature during the last month. However, it should be noted that for 8% of the health facilities the temperature had dropped to less than two degrees in the last month.<sup>9</sup>

**Graph 22. The Number of times that the temperature in the fridge dropped below 2° degrees**



### 10.4. Fridge Management

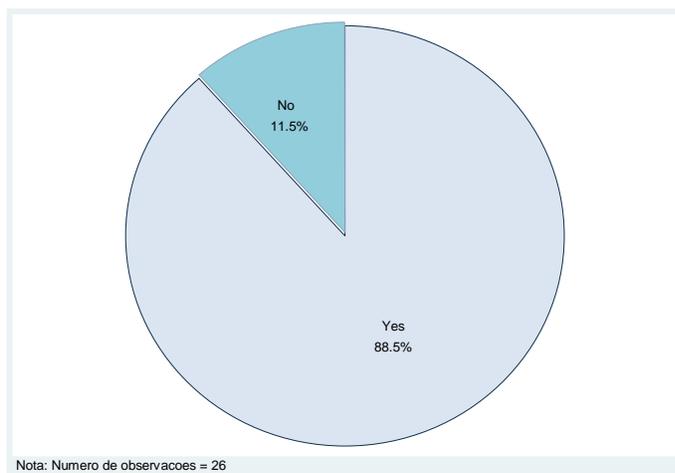
The majority of fridges had temperature registration forms (91%), however, of those health facilities with registration forms only three quarters of the forms had been filled in (77%). Less than a fifth of fridges had any maintenance or operating guidelines (17%)

<sup>9</sup> This is outside of the acceptable range of temperatures for the vaccines

### 10.5. Health worker Experience

The majority of health workers (88.5%) are confident in their ability to manage and administer vaccinations. Graph 23.

**Graph 23 Percentage of health workers that are confident of their ability to manage and administer vaccines.**



## 11. Conclusions and Key Observations

The rates of full immunization (before 12 months of age) are extremely low, with the districts of Lichinga and Cuamba demonstrating alarmingly low rates of vaccination. There is low compliance to the vaccine calendar and there is systematic late administration of vaccinations. The coverage rate for vaccination, including children older than 12 months is also low at reasonable (64%) considerably lower than the vaccination rate in Cabo Delgado (89%).

The patterns of “missed opportunities” demonstrate that one of the major problems is cold chain management as the lack of vaccines in the health centres is the main reason for failing to vaccinate children that go to the health facilities seeking vaccination.

Although there are issues regarding access to health facilities with 42% of people having to walk for more than an hour to reach a facility, there is demonstrable coverage of the health services in the high percentage of mothers with health cards and the adherence to the growth monitoring clinics (92%).

The respondents also stated that there is a lack of clear information about vaccinations and an explanation of the importance of immunizing infants in compliance with the vaccine calendar. The majority of people receive information through the health workers; and this source of

information should be strengthened in order to further encourage families to vaccinate their children.

Some issues raised in the baseline:

- vi. The VillageReach and DPS programme to strengthen the Child Immunization Cold Chain in the province of Niassa should learn from the successes of the Cabo Delgado initiative, and apply similar procedures to the cold chain management in Niassa.
- vii. The analysis clearly showed that there are missed opportunities for vaccination and eliminating these should be a priority in the first phase of the project.
- viii. Additional work on the information campaigns; good IEC material should be developed to clearly explain to care takers of children, not only the need for vaccination but the reason for vaccination. This will increase compliance and increase coverage
- ix. Given the low population density and the weak health facility network the intensification of the use of mobile clinics should be considered by the DPS and VillageReach in the first phase of the project.
- x. In the study it was shown that there is a serious stock management issue relating to the RDTs. Learning from the experience of improving the vaccine cold chain, the Dedicated Logistics Systems is well positioned to make similar improvements for RDTs.

**Maputo**

**November 2010.**

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Statistical Analysis. Field Work Results and Data Analysis from the Evaluation of the MISAU/FDC/VillageReach Project to Support PAV in the Cabo Delgado Province of Mozambique. October 20. 2008. Katie Leach-Kemon, Researcher Mariana Dionísio, Researcher. Nelia Taimo.

World Health Organization. Immunization Cluster Coverage Survey--Reference Manual. Geneva, 2005

**Annex 1. Detailed Tables of Results (attached under separate cover)**

## Annex 2. Community Leaders Interview List

Quadro – Líderes entrevistados por aglomerado, posição e nome

Annex 3. Questionnaires used in the survey (attached under separate cover).