Tanzania EVM assessment

29 May - 30 June 2012

Findings and recommendations of the assessment

28 June 2012

Contents

1. Acronyms

°C	degrees centigrade
AD	Auto-disable (syringe)
BCG	bacille Calmette-Guérin (tuberculosis vaccine)
CVS	Central Vaccine Store (Primary Store)
CSSC	Christian Social Services Commission
CC	Cold Chain
CHMT	Council Health Management Team
DTP	Diphtheria, Tetanus and Pertussis vaccine
DCCO	District cold chain officer
DHMT	District Health Management Team
DVD-MT	District Vaccine Data-Management tool
DVS	District Vaccine Store (Last distribution Level)
EEFO	Earliest-Expiry-First-Out
ESA	Eastern and Southern Africa (WHO regional office)
EVM	Effective Vaccine Management
EPI	Expanded Programme on Immunisation
FBO	Faith Based Organization
FI	Freeze Indicators
FIC	Fully Immunized Child
GAVI	Global Alliance for Vaccines and Immunisation
Hib	Haemophilus Influenza b
HF	Health Facility / PHC
HepB	Hepatitis B vaccine
ILR	Ice Lined Refrigerator
IVD	Immunization Vaccine and Development (Unit/Department)
ICC	Inter-Coordination Committee
IST	Inter-country Support Team
JE	Japanese encephalitis vaccine
LRC	Lot Release Certificate
LD	Lowest delivery level store
MCHIP	Maternal and Child Health Integrated Programme
MSD	Medical Stores Department
MoH	Ministry of Health
OPV	Oral Polio Vaccine
PR	Primary store
RVS	Regional Vaccine Store (Sub-national store)
RCCO	Regional cold chain officer
SP	Service point (health facility)
SOP	Standard Operating Procedure
SMT	Stock Management Tool
SN	Sub-national store
Th.	Tanzanian Shillings (1$=1,600 Tsh.)
UNICEF	United Nations Children's Fund
VAR	Vaccine Arrival Report
VVM	Vaccine Vial Monitor
VM	Vaccine Management
WICR	Walk in cold room
WIFR	Walk in freezer room
WHO	World Health Organization

2. Acknowledgements

This document has been prepared by Dr. Kshem Prasad - WHO-Consultant for EVM assessment, in collaboration with Mr. Moussa Valle - WHO Temporary Advisor, and support from Mr. Chirstopher Kamugisha, WHO-IVD Team Leader; Mr. Kabelwa Kagaruki, MCHIP Immunization Logistics Officer and Mr. Wiliam Msirkale, Logistic Manager-EPI Tanzania.

The team would like to thank the Ministry of Health and Social Welfare, particularly the IVD unit for their support for undertaking and the successful rollout of this mission. The consultants are thankful to WHO-HQ, WHO AFRO IST/ES, WHO-Tazania for the facilitation of the assessment and MCHIP / USAID for co-financing and supporting the activity.

The consultants deeply appreciate the active and full involvement by Dr. Dafrossa Lyimo - EPI programme manager and her whole IVD team throughout the assessment mission, and their valuable support.

3. Related documents

The following spread sheets and documents were used in the preparation of this report:

- Comprehensive Multi-Year Plan
- VM assessment 2009
- Cold Chain Inventory,
- National immunization schedule
- MoH documents / SOPs, old Recommendations etc list
- All EVM Assessment Excel files filled by team members
- Photos taken during assessment

4. Assessment team

The participants who attended the training are listed in Annexure A

Annexure C gives the list of assessors and the assessment sites.

5. Executive Summary

5.1 Introduction

The vaccine supply chain comprising of the vaccine and cold chain logistics and management is the backbone of the immunization programme. The new vaccines that are being introduced in recent times in the immunization programme, are far more costly than the traditional ones.

The cost of the vaccines alone for a fully immunised child in Tanzania is currently Tsh. 10,050. This will increase to Tsh. 51,020 when the PCV and Rotavirus will be introduced in January 2013.

Accordingly, the central vaccine store is required to keep a peak stock of 6 Months plus 25%, and the regions and districts are required to keep a peak stock of 3 months plus 25%. The value of the peak stock of vaccines at the central store is currently Tsh. 10.6 Billion, which will increase to Tsh. 53.9 Billion when the new vaccines are procured and stored at the CVS. Likewise, the value of peak stock of vaccines at a district with a target population of 10,000, is currently Tsh. 31 million, and this will increase to Tsh. 159 Million.

Hence, the vaccine and cold chain logistics needs to be managed more cautiously, effectively and efficiently than ever before. Even a small lapse can result in losses of vaccines worth a significant amount.

The first VM assessment, involving the Ministries of Health and Social Welfare in Tanzania Mainland and Zanzibar, was conducted in November 2007 and the country scored 76% The second assessment was conducted from 7th to 12th December 2009 and the overall score was 79% for both countries together.

Following the second assessment, a series of recommendations were generated to improve the system. Of these, the Republic of Tanzania has implemented 71% completely and 13% partially. 16% have not been implemented at all.

This is the third vaccine management assessment, which again involves both ministries of health from mainland and Zanzibar, using the new Global Effective Vaccine Management initiative (EVM) from WHO-UNICEF. It is a revised tool of the former Vaccine Management Assessment tool. It is designed to help countries achieve high standards of performance in immunization logistics at all levels in vaccine supply chain. The system provides tools and supporting documentation needed to monitor and assess the vaccine supply chain and thereby improve its performance.

The specific objectives were to assess vaccine management structure and procedure, analyse knowledge of health staff and their practices in vaccine management at all levels, identify gaps, develop recommendations and disseminate findings to stakeholders for improvement and support.

The EVM assessment was conducted in June 2012. The assessment reviewed the records for the period 1 June 2011 to 31 May 2012.

The Central vaccine store (CVS) at the Medical Stores Department (MSD), and all the regional vaccines stores (20) in the Mainland, were selected for the assessment.

“WHO-Site Selection Tool” was used based on 90% confidence and 15% precision to randomly select 27 out of 119 districts. Some regions had two DVSs selected due to population. One additional DVS was selected during the assessment exercise conducted during the training at Dodoma (DVS-Chamwino). In each district, one health facility was selected randomly, using the same tool. Thus a total of 27 health facilities were assessed.

5.2 Results

The table below gives the EVM performance scores for the different levels of vaccine stores. The consolidated score is computed for the 20 RVSs, 28 DVSs and 27 HFs. All scores that are less than or equal to 70% are indicated in red (considered as critical), and those more than or equal to 90% are marked in green (to mark as very good). The last column provides the average of the 4 levels. The global average score is 85%.

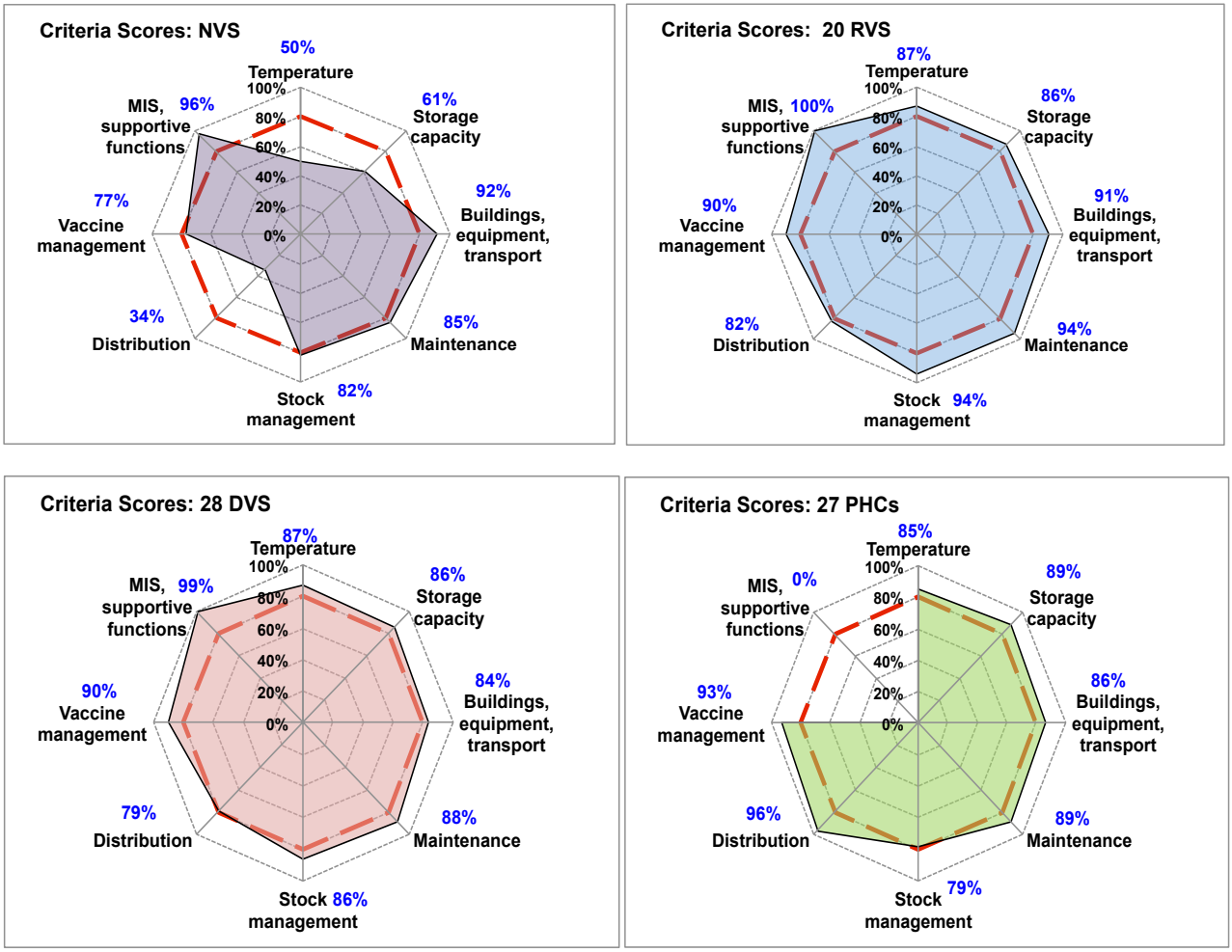
Table 1. Consolidated Scores of EVM assessment (0-70% in red and >90% in green)

#	Indicator / Criteria	Consolidated Scores				
		Central	20 RVS	28 DVS	27 HFs	Average
1	Vaccine Arrival Process	83%	NA	NA	NA	83%
2	Vaccine Storage Temperature	**50%**	87%	87%	85%	77%
3	Storage Capacity	**61%**	86%	86%	89%	81%
4	Building, Cold Chain Equipment & Transport	**92%**	**91%**	84%	86%	88%
5	Maintenance of Building, Cold Chain & Transport	85%	**94%**	88%	89%	89%
6	Stock Management	82%	**94%**	86%	79%	85%
7	Distribution	**34%**	82%	79%	**96%**	73%
8	Vaccine Management Practices	77%	**90%**	**90%**	**93%**	87%
9	MIS & Supportive Functions	**96%**	**100%**	**99%**	NA	**98%**

These resuts are illustrated in the spider graph below. In order to be able to appreciate the comparison of the spider graph of different level, indicator on vaccine arrival has been excluded from the graphs.

Note that “MIS and supportive functions” does not apply at HF level and hence is nil.

Figure 1. EVM assessment performance spider graphs



The table and the graphs above indicate that most of the scores are equal to or greater than 77% with exception of 3 indicators at national level. 2 indicator at CVS, 5 indicators at RVS, and 2 at DVS and HFs have achieved excellent scores of 90% or more.

The overall good scores achieved at most levels are attributed to a series of key strengths that have been sustained or improved since the last VMA in 2009, thanks to a strong logistic management through experienced logistic officers of EPI and partner agencies, and for the implementation of majority of past recommendations.

5.3 All levels

Strengths :

- The country have a series of guidelines and training materials that have been supporting the immunization programme officers at different level,
- Tanzania has defined standardised formats for maintaining manual records of temperature, vaccines and injection material stocks, wastage, requisition and supplies,
- All vaccines, from international shipment, have been received in good condition,
- Most staff have good knowledge and practice safe vaccine storage and manual temperature monitoring is well maintained,
- The storage capacity is in general good, specially for OPV, and ice pack freezing, and dry storage at most levels,
- The buildings housing the vaccines stores are mostly suitable and well maintained,
- Cold chain equipment is suitable at present at the regional and health facilities,
- Stock management is done using the WHO's Stock Management tool at the central and regional level and using District vaccine data – management tool (DVD-MT) and ledger books below that. Use of this tool helps adherence to required standards,
- Maximum and minimum stocks are defined in the STM, and used for ordering,
- At the CVS, ZVS and DVS, there is an issue voucher for every requisition. At CVS and RVS the entries are done in the SMT while at DVS they are done in the ledger book,
- The store managers following the EEFO with attention to the stats of VVM.
- Freeze tags are used along with freeze sensitive vaccines during storage.
- Distribution at all levels except the central level is well organized,
- Safe vaccine distribution is assured through proper planning and the Vaccine store staff accompanying the vehicles at the regional and district level during distribution. No vaccines have been lost due to problems of transport at any level.
- Vaccine management policies in the field are implemented correctly, including MDVP and use of reconstituted vaccines,
- Standard forms are available and used for recording of wastage. Data systematically received form District - which collates information from health facilities, and then this is entered into the SMT.
- Disposal of wasted / damaged vials is carried out through incineration after following the standard waste management procedures.

The reasons for some loss of scores, and other limitations that affect all levels are :

Weaknesses

- Supportive supervision visits are marked in book 2, and not on all documents that are verified. This results in information missing on any action taken if warranted.
- The manual temperature recording forms does not provide specific space for inclusion of other issues such as power-outs, defrosting or maintenance. The blank space provided for remarks is usually left unused,
- The requisition form has the names of the vaccines printed on it, but not that of the

diluents and other ancillary materials. Thus staff rely on their memory to make a comprehensive requisition,

- Absence of written guidelines or SOPs for contingency at any level.
- Insulated boxes, which come together with vaccines from manufacturers, are being used at CVs, RVS and DVS instead of cold boxes for distribution of vaccines,
- Freeze indicators are not implemented during transport
- The status of VVM (as well as Freeze indicators) are not systematically recoded during issuing, and mostly not recorded upon receipt, in the issue voucher.
- Many of the store managers at all levels, lack knowledge on shake test, proper ice pack conditioning, and correct method of packing of cold boxes,
- Private facilities are not maintained as these are in rented locations. Their services are also less performing due to high rotation of staff.

Addressing these issues will further increase the performance at all levels.

Recommendations

- ✓ In view of strengthening supervision, supervisors should review the records at least once a month, discuss the results with the store officer, take any corrective action if warranted. They should confirm their approval of proper vaccine management through their signature on the respective recording forms,
- ✓ The format of the temperature recording form, requisition form, and issue form need to be revised to include all relevant parameters that need to be recorded.
- ✓ MoH should purchase more Freeze Indicators and supply them to every store for use during transportation of all freeze sensitive vaccines.
- ✓ Capacity building programmes should include revisions on correct methods of ice pack conditioning, packing of ice pack in a cold box, marking of date when opening a vial of liquid vaccines, carry out practical exercises of shake test, and developing of contingency plans.
- ✓ Implement correct practices of recoding the following:
    - Proper filling of the VAR by the CVS manager and sending a copy to IVD and UNICEF within a prescribed period,
    - All activities associated with the cold chain equipment on the temperature recording form,
    - Complete details of all items in the requisition form,
    - Noting the VVM status during issue and receipt of vaccines in the issue vouchers,
    - Conducting proper physical inventories to keep mismatches low,
    - Use of PQS qualified cold boxes for all vaccines transport.
- ✓ The Private Public Partnership (PPP) should include adequate supervision of the immunization services to ensure that the private clinics adhere to the recommended standards.
- ✓ Ensure fast track clearing of all immunization related materials – vaccines, syringes, and cold chain spares.

5.4 Central level

The scores are weakest at the central store with 3 indicators in the critical zone. Of these, indicator 3 on storage capacity (present performance 61%) will get a significant boost once the 8 new WICRs, recently installed for EPI at the new wing of the MSD, are officially commissioned. This will enhance the total storage capacity of vaccine storage, and increase the performance score to 78%. The main areas of concern are :

Weaknesses

- The Central level staff, belonging to the MSD, has not obtained any formal training

though in position since 2 years, and is not fully confident of many aspects of vaccine management,

- Stock out of BCG from 30 April to 31 May in 2012. Delays in the delivery was reported due to delay in release of funding for procurement.
- Vaccine Arrival reports are not filled for every vaccine arrival and those filled not submitted within required time,
- The country has not conducted any temperature monitoring study, or mapping of any of the WICRs,
- The old WICRs do not have any continuous temperature recording system, or records,
- Currently, the vaccine storage capacity (at +2 to 8 C) is insufficient based on 6 months plus 25% of stock.
- Inadequate stock of cold boxes. Foam boxes supplied by manufacturers are being used for deliveries to the other zonal MSD and to the RVSs.
- Lack of distribution programme. Distribution is planned based on demands from the RVSs, based on a pull system. No one from the CVS accompanies the vehicles during delivery, and the drivers have no special training on handling of vaccines.

The following recommendations will help redress this situation

Recommendations

- ✓ At least two central level vaccine store managers/officers MUST be included in induction and periodic training conducted for the vaccine managers. They are the care takers of the maximum worth of vaccines,
- ✓ To ensure an interrupted supply and stock of vaccines for the immunization programme, ensure that all required funding for the peak stocks of vaccines is released on time. Preferably, make provision of a financial buffer to take care of any unexpected delays in releasing of funds,
- ✓ Tanzania should conduct a temperature monitoring study based on the WHO guidelines, and carry out temperature mapping of all WICRs,
- ✓ A VAR MUST be filled for each and every vaccine lot that arrives into the country.

  A copy of the VAR along with the Lot Release Certificate should be kept at the CVS, and with EPI for purposes of any follow up or inquiry.
- ✓ All new WICRs should be commissioned rapidly and handed over for use by the EPI.
- ✓ All WICRs and WIFRs used for storing vaccines MUST have continuous temperature recorders,
- ✓ Proper distribution plans and related communication should be established between CVS and RVSs. It MUST not depend on drivers alone,
- ✓ All transport of vaccine to be carried out using PQS qualified cold boxes, unless transport is done using refrigerated trucks.

5.5 RVS, DVS and HF levels

A few of the issues are common to the RVS, DVS and health facilities. These have been clubbed together.

Weaknesses

- Several vaccine store buildings are in poor conditions,
- Inadequate vaccine storage at some districts and health facilities currently, some will face difficulty when the new vaccines arrive,
- Several districts do not have adequate dry stores,
- The transport capacity at the DVSs is inadequate.
- Lack of sufficient numbers of voltage stabilizers at all levels,
- Several vaccines stores do not have generators or the generator is not connected to

vaccine store,

- Several districts have to share pooled vehicles, and hence at times are not the suitable for vaccine transport (uncovered vans) ,
- Some of the RCCOs who were trained in technical repairs have been shifted to other services and are no longer available for this service.

Recommendations

- ✓ Several RVS / DVS vaccines or dry stores need improvement, or proper allocation of building space,
- ✓ Additional ice-lined refrigerators (ILRs) to be installed at all location that have shortage of space in the current situation, and at those that will face shortage with the introduction of new vaccines,
- ✓ Ensure provision of generators and voltage stabilizers where required,
- ✓ Each districts MUST have a specific adequate vehicle available for vaccine supply within its pool of vehicles. Priority should be given for all vaccine and associated distribution .
- ✓ Every district should ensure that one trained technical staff is appointed for maintenance of cold chain equipment through the CHMT/ DHMT.
- ✓ All unwanted / non-usable items should be kept out of the vaccine and dry stores. A space should be dedicated for such items while awaiting disposal.

6. Introduction

6.1 Introduction to EVM

The vaccine supply chain comprising of the vaccine and cold chain logistics or immunisation logistics is the backbone of the immunization programme. It ensures that vaccines reach the infants in a safe and potent condition to help immunize them against the vaccine preventable diseases.

The new vaccines that are being introduced in recent times in to the immunization programme, are far more costly than the traditional ones. The table below gives the cost of the vaccines used in the current and future schedule for a fully immunized child (FIC). The cost of the vaccines alone for a fully immunised child in Tanzania is currently Tsh. 10,050. This will increase to Tsh. 51,020 when the PCV and Rotavirus will be introduced in January 2013.

Table 2. Cost of vaccines in the current and future schedule

Vaccine	No of doses	Presen-tation	Total cost of vial	Cost per dose	Cost for required doses	
	#	Doses/vial	$	$	$	Tsh.
BCG	1	20	2.29	0.11	0.11	
OPV	4	20	2.84	0.14	0.57	
Pentavalent	3	10	17.50	1.75	5.25	
Measles	1	10	2.44	0.24	0.24	
TT	2	20	1.10	0.06	0.11	
Current Sub total for FIC			**26.17**	**4.32**	**6.28**	**10,051**
Rota	2	1	7.50	7.50	15.00	
PCV-10	3	2	7.07	3.54	10.61	
Total from Jan 2013 for FIC			**40.74**	**15.36**	**31.89**	**51,019**

As a result the total worth of vaccines at the central levels and lower levels can be estimated, based on the recommended peak stocks. The table below gives the details.

Table 3. Worth of vaccines at different levels based on recommended peak stock

Tanzania			Present situation			From January 2013		
Level	Peak Stock	Annual Target	Cost of FIC	Worth of Stock		Cost of FIC	Worth of stock	
	Months	0-11 months	$	Thousand $	Million Tsh.	$	Thousand $	Million Tsh.
CVS	6 + 25%	1,690,776	6.3	6,638	10,621	31.9	33,696	53,914
RVS (Iringa)	3 + 25%	50,000	6.3	98	157	31.9	498	797
DVS(Morogoro)	3 + 25%	10,000	6.3	20	31	31.9	100	159
HFs	1.5	500	6.3	0.4	0.6	31.9	2.0	3.2

The central vaccine store is required to keep a peak stock of 6 Months plus 25%, and the regions and districts are required to keep a peak stock of 3 months plus 25%. The value of the peak stock of vaccines at the central store is currently Tsh. 10.6 Billion, which will increase to Tsh. 53.9 Billion when the new vaccines are procured and stored at the CVS. Likewise, the value of peak stock of vaccines at a district with a target population of 10,000, is currently Tsh. 31 million, and this will increase to Tsh. 159 Million.

Hence, the vaccine and cold chain logistics needs to be managed more cautiously, effectively and efficiently than ever before. Even a small lapse can result in losses of vaccines worth a significant amount.

Therefore, a consistently high standard of supply chain management needs to be maintained. This can only be achieved if all the links in the supply chain comply with current good storage and distribution practices.

The Vaccine Management Assessment is conducted to help the country to improve the quality management of vaccines from national store to service delivery level. According to the WHO guidelines, the Vaccine Management Assessment is to be carried out at all levels of operation after every two years.

The first vaccine management assessment, involving the Ministries of Health and Social Welfare in Tanzania Mainland and Zanzibar, was conducted in 2007 and the two countries together scored 76% The second assessment was conducted from 7th to 12th December 2009 and the two countries together scored 79%.

Following the second assessment, a series of recommendations were generated to improve the system. Of these, the Republic of Tanzania has implemented 71% completely and 13% partially; 16 % still remain to be implemented.

This is the third vaccine management assessment, which again involves both ministries of health from mainland and Zanzibar, using the new Global Effective Vaccine Management initiative (EVM) from WHO-UNICEF.

The Global Effective Vaccine Management initiative (EVM) is designed to help countries achieve high standards of performance in immunization logistics at all levels in vaccine supply chain. The system provides tools and supporting documentation needed to monitor and assess the vaccine supply chain and thereby improve its performance.

The specific objectives were to assess vaccine management structure and procedure, analyse knowledge of health staff and their practices in vaccine management at all levels, identify gaps, develop recommendations and disseminate findings to stakeholders for improvement and support.

6.2 Objective

To improve the management, monitoring and supervision of immunization supply chains in a systematic manner. The assessment therefore aims at identifying the following aspects of cold chain and vaccine management:

- **Strengths & good practices**
- **Major knowledge gaps**
- **Major performance gaps**
- **Resource and Training needs**

Based on these findings, provide recommendations to prepare a road map for strengthening Cold chain and vaccine management, through addressing the different management aspects.

6.3 The Tool

WHO-UNICEF have designed the Global Effective Vaccine Management (EVM) initiative to help countries to improve the quality of their vaccine and cold chain management from the time the vaccine arrives in their country down to the service delivery point. Assessment of the vaccine and cold chain management is mandatory for any country applying for GAVI support for introduction of new vaccines. It is based on nine basic *indicators listed below.*

1. Pre-shipment and arrival procedures (Applies to primary stores only)
2. Vaccine storage within recommended temperatures
3. Cold storage, dry storage and transport capacity
4. Buildings, cold chain equipment and transport
5. Maintenance & Repair
6. Stock management

7. Effective vaccine distribution
8. Appropriate vaccine management policies and practices
9. Information Systems and Supportive Management functions.
   (does not apply at service delivery level)

The EVM consists of a series of focused questions, which are numerically scored based on the observed practices and records of the past 12 months, against recommended standards.

Level of Assessment

The EVM assesses four different levels and these are:

i) Primary vaccine store (national receiving vaccines direct from manufacturers.
ii) Sub-national stores (regional or provincial vaccine stores receiving vaccines from primary store.
iii) Lowest delivery level (district vaccine stores that supply to health facilities directly).
iv) Service point (health facilities with or without refrigerators).

The performance scores are depicted graphically on a radar graph to reflect the strengths and weaknesses of a vaccine supply chain system. Based on these, the assessors can define the nature of support required for improving the performance of each indicator. Specific and targeted actions can be then taken for strengthen the different programmatic areas associated with the supply chain.

6.4 Site selection

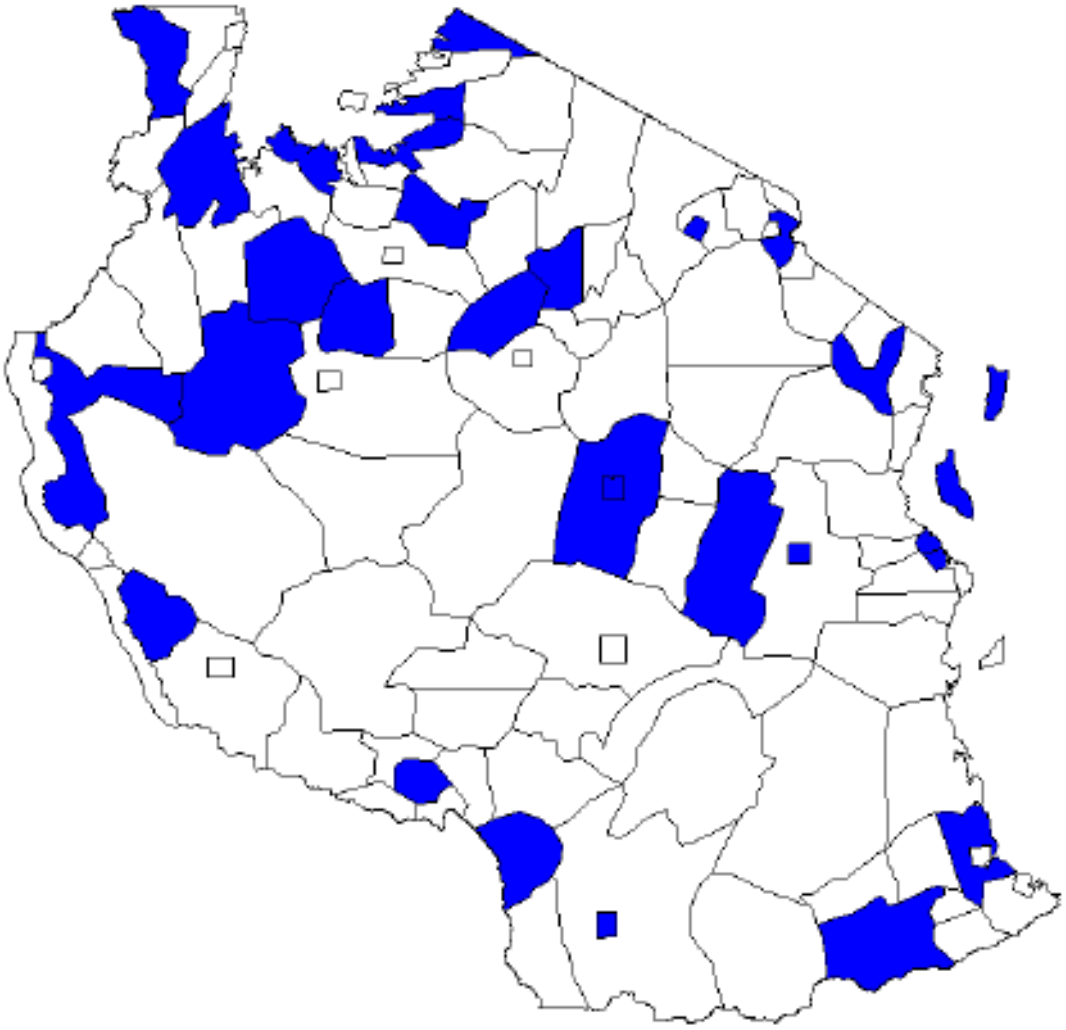
The Central vaccine store (CVS) at the Medical Stores Department (MSD), and all the regional vaccines stores were selected for the assessment.

"WHO-Site Selection Tool" was used based on 90% confidence and 15% precision to randomly select 27 out of 119 districts. Some regions had two DVSs selected due to population. One additional DVS was selected during the assessment exercise conducted during the training at Dodoma (DVS-Chamwino).

In each district, one health facility was selected randomly, using the same tool. Mpale health facility had to be replaced by Lwengera dispensary, as cold chain equipment was no longer operating since several months. No health facility was selected or assessed below the DVS-Chamwino. Thus a total of 27 health facilities were assessed.

Annexure C gives the list of assessors along with the sites assessed.

Figure 2. Map showing districts selected for the EVMA, 2012



6.5 Assessment types and tool version used

The EVM tool used is version 1.0.5.0. The assessment was structured and full.

7. Country background

Tanzania Mainland covers an area of approximately 945,050 km^2 including 59,050 km^2 on inland waters. The Country is bordered by Kenya and Uganda on the northern part, the Democratic Republic of Congo, Rwanda and Burundi on the Western part, Zambia, Malawi and Mozambique on the Southern part, and the Indian Ocean on the Eastern part. It lies between the 1°S and 12°S latitudes and 30°E and 40°E longitudes

Tanzania Mainland has 21 administrative regions and 119 districts. The projected population (using 2002 Census) for 2012 is 44,474,439 of which 1,690,776 are under one year of age.

According to the TDHS, 2004/05 and TDHS, 2010, in 2009/10, the life expectancy at birth has increased to 59 years; under-five and maternal mortalities have dropped to 81 per 1,000 live births and 454 per 100,000 live births, respectively.

Table 4. Key indicators from TDHS

Indicator	1999	2004/05	2009/10	Description
Life expectancy at births	54	56	59	Years
Under 5 mortality rate	147	112	81	Per 1,000 live births
Infant Mortality Rate	99	68	51	Per 1,000 live births
Neonatal Mortality rate	36	32	26	Per 1,000 live births
Immunisation coverage (using DTP3)	76	85	88	Children aged 12-23 months
Maternal Mortality Ratio	529	578	454	Per 100,000 live births

Tanzania has decentralised many Government functions through “decentralisation by devolution”, since 1994. The District Councils are responsible for the delivery, planning, budgeting and management of local public health services. Primary health care services from the basis of the pyramidal structure of health care services.

Currently there are 6,479 health facilities. Among these, 246 are hospitals including referral, consultant and specialised hospitals (61% government 34% FBOs (Faith Based Organization), and 15% private), 691 health centres (69% government, 18% FBOs and 13 percent private); and 5,542 dispensaries (79% government, 11% FBOs, and 10% private). Out 6,479 health facilities 5,500 facilities (85%) provide immunization services. The table below provides a summary overview.

Table 5. Distribution of the 6,479 health facilities.

	Type	Total	Govt	FBOs*	Private
1	Hospitals	246	61%	34%	15%
2	Health Centres	691	69%	185	13%
3	Dispensaries	5542	79%	11%	10%
	Total	6,479			

* Faith Based Organisations (FBOs)

Faith Based Organisations has a network umbrella organisation, Christian Social Services Commission (CSSC), which actively participate in policy development, human resources capacity building and recruitment. CSSC is also a member of the SWAP coordination committee, technical committee, ICC and management committees.

About 90% of the population lives within five kilometres of a primary health facility. However, the quality health services is a major challenge due to acute shortage of health workforce, stock out of essential drugs, and operational budget (PHDP/MMAM, 2008: Health Bulletin, 2009).

The Expanded Program on Immunization has accessibility of immunization services to majority of the population. The administrative infrastructure exists up to the village level where executive officers are responsible for all matters including social mobilization.

Immunization services in both public and private health facilities are offered free of charge to the public nationwide.

Immunization coverage survey conducted September 2008 indicated routine immunization by crude coverage (card and history) for BCG was 98.4%, DTP-HepB3 were 94.7% and measles was 84.8%. Valid coverage based on the card only BCG was 96.7%, DPT-HepB3 80.6% and measles 71.3%.

Tanzania Demographic and Health Survey 2010 results indicate that routine immunization coverage by the time of the survey (according to vaccination card and history) by antigen showed that the coverage for BCG was 95.4%, DTP-HepB3 were 87.8% and measles was 84.5%.

7.1 Organization of immunization services

The Expanded Programme on Immunisation is under the Directorate of the Preventive Service of the Ministry of Health and Social Welfare under the Child and Reproductive Health Section, one of the four sections of the Preventive services Department. The figure on the next page depicts the EPI in the organogram of the Ministry of Health and Social Welfare.

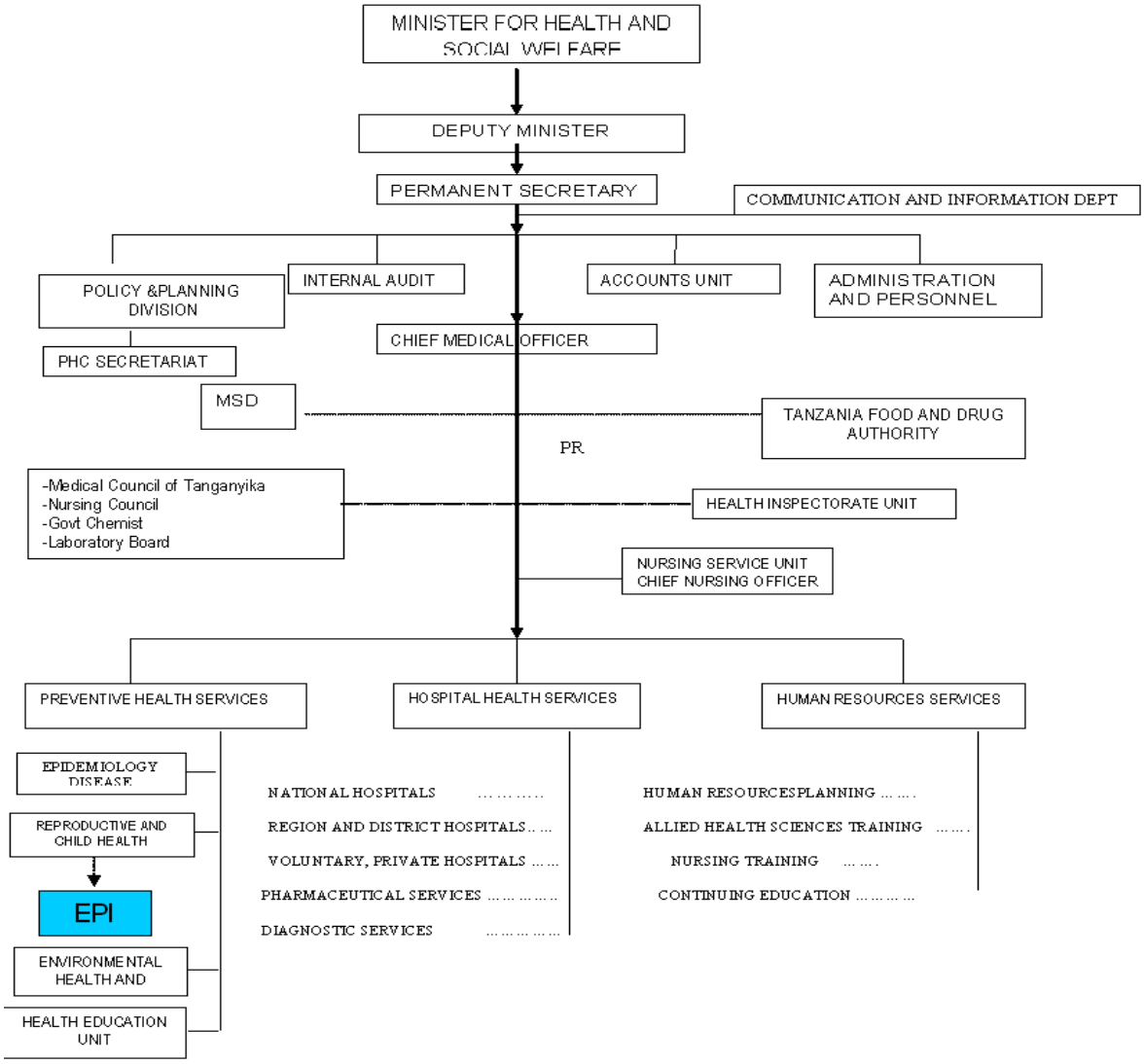
The Programme manager is the overall in-charge of the Programme. The Programme comprises of five main sections; administration, monitoring/evaluation, cold chain/logistics, new development and research and training. The national level is responsible for formulating policies, guidelines and standards for strategic planning and budgeting. Other functions include monitoring, training, technical support, supervision, facilitating procurements of vaccines, equipment /related supplies and ensuring adherence to quality service delivery.

At regional level there is a Regional Immunization and Vaccines Officer (RIVO) and Regional Reproductive and Child Health Coordinator (RRCHCO). These personnel are answerable to the Regional Medical Officer (RMO) and are responsible for management and coordination of immunization activities. They work closely with the District Immunization and Vaccines Officer (DIVO) and District Reproductive and Child Health Coordinators to provide technical support to health workers in immunization services and distribution of vaccines and supplies. Although RIVO and RRCHCO have enough capacity to provide technical support through supportive supervision to the district, lack of resources (vehicles/financial) affects its implementation. At the district level supportive supervision is supposed to be conducted monthly however, cancellation is common due to above mentioned reasons. District Health Management Team do conduct supportive supervision, however the quality of supervision is a challenge. The District Medical Officer is the overall manager at district.

At health facility level implementation of immunization activities is done by MCH-Aides/PHNB responsible for immunization, social mobilization, outreach activities and record keeping. Human resource crisis in the health sector leads to a MCH Aide/Nurse assistant to run all activities in some health facilities.

Staff has high moral commitment towards immunization but are constrained due to scarcity of funds, transport and training.

Figure 3. Organogram of the Ministry of Health and Social Welfare and IVD (formerly EPI)



7.2 Immunization schedule and suppliers

Since April 2012 the schedule has been revised with the inclusion of the PCV-10 and rotavirus vaccines. The schedule is as given below. The new vaccines that shall be introduced from January 2013 are marked in blue.

Table 6. Immunization Schedule

Vaccine	Age				
	Birth	6 weeks	10 weeks	14 weeks	9 months
BCG	x				
Oral polio Vaccine (OPV)	x	x	x	x	
DPT-HepB-Hib (Pentavalent)		x	x	x	
Pneumococcal Conjugate Vaccine (PCV-10)		x	x	x	
Rotavirus		x	x		
Measles					x

Tanzania procures all vaccines and EPI injection materials and cold chain equipment through UNICEF. The govt. is funding all traditional vaccines and injection materials, and some of the cold chain equipment. Pentavalent (DPT-HepB-Hib) vaccines are financed by the GAVI and co-financed by the Government of Tanzania.

7.3 Planned vaccine introductions

The country is planning to introduce pneumococcal and rotavirus vaccine in January 2013. The country is in the application process of introducing measles second dose. The application for measles second dose is not yet submitted.

Plans for introduction of Human Papilloma Vaccine (HPV) is on the way, pending availability of operational cost.

7.4 Characteristics of vaccines of the national immunization programme

The table below summarizes the characteristics of the traditional vaccines and new vaccines that have been introduced in Tanzania. The last two vaccines (PCV10 and rotavirus) will be introduced in January 2013. MDVP was adopted in the country and is being observed at all health facilities.

Table 7. Characteristics of the vaccines

Antigen	Formulation	Presentation Doses / vial	Target	Cover age Target	No. doses admini-stered	Wastage Rate (%)	With VVM	Vol/dose Cucm
BCG	Lypholized	20	0-11m	95	1	70	VVM30	1.2
OPV	Liquid	20	0-11m	95	4	10	VVM2	1.0
DPT-Hep-Hib	Liquid	10	0-11m	95	3	10	VVM7	2.6
TT	Liquid	20	Preg/ WCBA	90	2	10	VVM30	2.5
Measles	lyophilized	10	0-11m	95	1	30	VVM14	3.0
PCV10	Liquid	2	0-11m	95	3	5	VVM14	4.8
Rota	Liquid	1	0-11m	95	2	5	VVM14	17.1

8. Supply chain overview

8.1 Logistics structure

The Medical Stores Department (MSD) receives all the vaccines at the Central level in the Central Vaccine Store(CVS), when they arrive at the airport. The CVS then distributes to the 20 regional vaccine stores (RVS) based on their demands, usually on a quarterly basis, and to the 3 district vaccine stores (DVS) of Dar-Es-Salaam on a monthly basis. Currently, the RVSs distribute in turn to their respective DVSs on a monthly basis. Finally the DVSs distribute to the health facilities monthly.

In principle the CVS is to store 6 months plus a 25% of vaccine stock, the RVSs and DVSs for 3 months plus25% and the health facility for 1.5 months.

8.2 Fixed infrastructure

Please refer to the cold chain inventory in Annex D.

8.3 Transport infrastructure

At the CVS, transport is managed by MSD using their own fleet of trucks. Each RVS has a vehicle, usually in the form of a hard top land cruser. At DVSs a variety of vehicles belonging to health sector / council are pooled for the distribution services.

Recently 2 refrigerated trucks have been procured by the MoH through CIDA support.

8.4 Recording and reporting systems

Standardised forms for recording the following have been developed and distributed by the MoH and partners.

- Temperature monitoring form and chalk board,
- Requisition form, Issues vouchers,
- WHO ‘s Cold Chain Inventory Tool (CCIT) is used for the cold chain equipment inventory management .
- WHO’s Stock Management tool (SMT) is used for stock management at central, regional level.
- The District Vaccine Data–Management Tool (DVD-MT) is used for the stock management and other immunization data at the DVS level.
- At the health facility the manual forms, including monthly immunization reporting forms and vaccine ledger books are used which allow collection of the required data to be included into the DVD-MT.
- Tally sheets for recording of immunizations at the health facilities.

9. Overall findings

The EVM assessment was conducted in June 2012. The assessment reviewed the records for the period 1 June 2011 to 31 May 2012.

The table below gives the EVM performance scores for the different levels of vaccine stores. The consolidated score is computed for the 20 RVSs, 28 DVSs and 27 HFs. All scores that are less than or equal to 70% are indicated in red (considered as critical), and those more than or equal to 90% are marked in green (to mark as very good). The last column provides the average of the 4 levels. The global average score is 85%.

The table below indicates that most of the scores are above77% with exception of 3 indicators at national level. 2 indicators at CVS, 5 indicators at RVS, and 2 at DVS and HFs have achieved excellent scores of 90% or more. Only 3 indicators at CVS are in the critical zone – less than 70%.

Of these, indicator 2 and 3 will get a significant boost once the 8 new WICRs get into operation officially before receipt / introduction of new vaccines at the end of the year, enhancing the total storage capacity as well implementing the continuous temperature recording. Distribution (Indicator 7) at the national level needs special attention, as is a result of total lack of planning of distribution which is currently relying on a pull system.

Table 8. Consolidated Scores of EVM assessment (0-70% in red and >90% in green)

#	Indicator / Criteria	Consolidated Scores				
		Central	20 RVS	28 DVS	27 HFs	Average
1	Vaccine Arrival Process	83%	NA	NA	NA	83%
2	Vaccine Storage Temperature	**50%**	87%	87%	85%	77%
3	Storage Capacity	**61%**	86%	86%	89%	81%
4	Building, Cold Chain Equipment & Transport	**92%**	**91%**	84%	86%	88%
5	Maintenance of Building, Cold Chain & Transport	85%	**94%**	88%	89%	89%
6	Stock Management	82%	**94%**	86%	79%	85%
7	Distribution	**34%**	82%	79%	**96%**	73%
8	Vaccine Management Practices	77%	**90%**	**90%**	**93%**	87%
9	MIS & Supportive Functions	**96%**	**100%**	**99%**	NA	**98%**

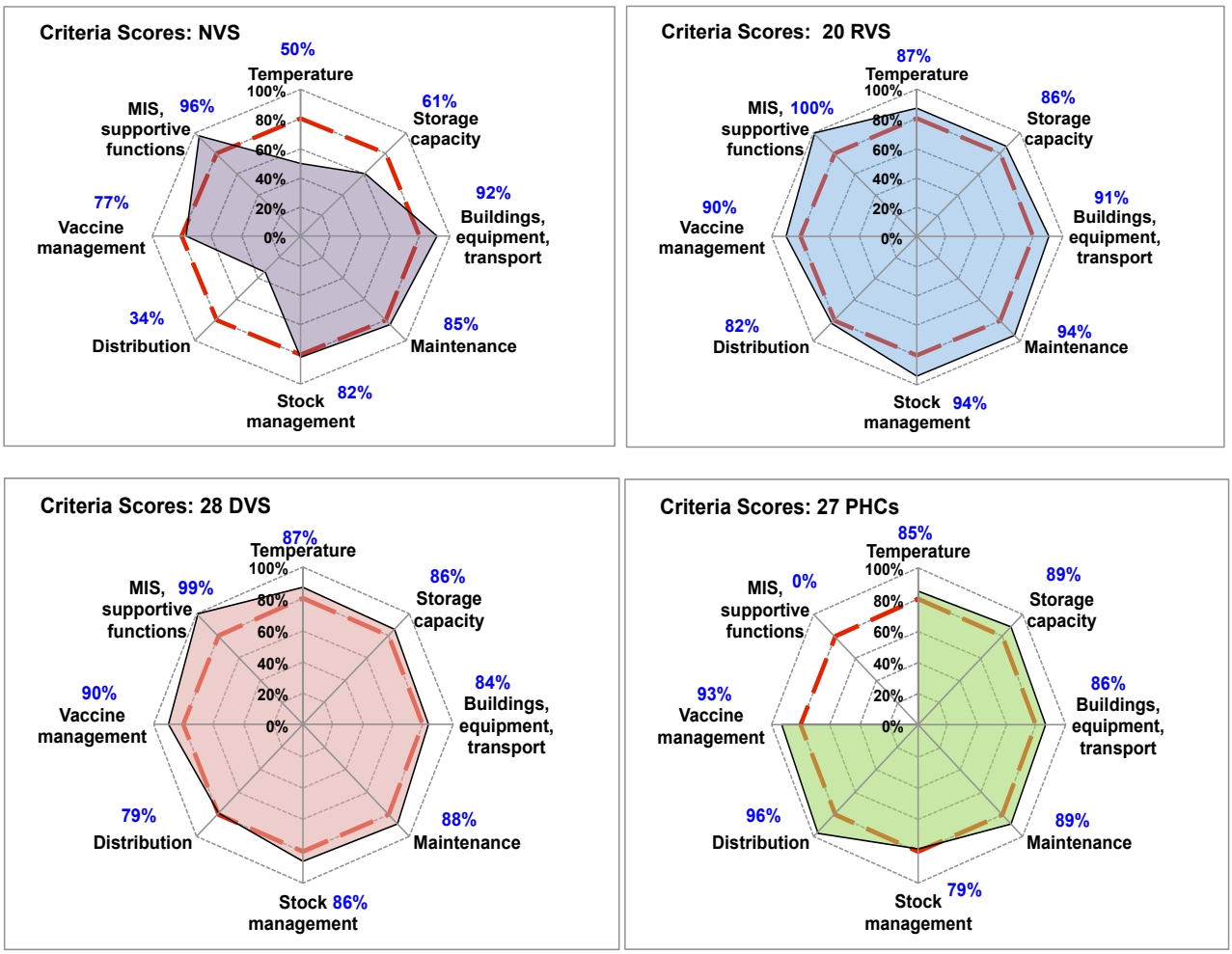
These resuts are illustrated in the spider graph below. In order to be able to appreciate the comparison of the spider graph of different level, indicate indicator on vaccine arrival has been excluded from the graphs.

At the central level, the weaknesses are observed for temperature monitoring, storage capacities and distribution. The storage capacities for regional vaccine stores will greatly improve when the new WICRs will be installed before the end of the year.

The performance at the regional, districts and health facilities is quite satisfactory for all the indicators, with excellent scores achieved for 5 indicators at regional level, and 2 indicators at district and health facilities.

Note that “MIS and supportive functions” does not apply at HF level and hence is nil.

Figure 3. EVM assessment performance spider graphs



The next section discusses these results according to the levels.

10. Detailed findings and recommendations

10.1 Pre-shipment and Arrival Procedures

This indicator assesses the process of vaccine arrival from the manufacturer to the primary store. It verifies the following aspects:

- The standard process of reporting of arrivals is followed
- A Lot Release Certificate is received for every lot of vaccines
- The clearing of the vaccine through the customs is reliable
- Measures for safekeeping of the vaccine during delays in clearing is ensured
- The process of receiving, clearing and checking of consumables is effective.

This criterion is applicable only to central vaccine store in Dar es Salaam.

The Central Vaccine Store (CVS) receives, verifies, records all international shipments along with the accompanying documents that are cleared by the MSD. These are then stored at the CVS, usually for 3 to 6 months, before they are shipped to the lower levels.

Findings

Vaccine Store	CVS	20 RVSs	28 DVSs	27 HFs
Score	83 %	NA	NA	NA

The good score obtained is attributed to the strengths stated below and that no vaccine lot was received in a damaged state.

Strengths

- MSD has a clearing department for all drugs and other health related materials. The process seems to be working well,
- There is an authorization from Ministry of Health to allow MSD to clear all the medical goods on behalf of MoH, and prohibiting use of private agent,
- A system to check all arrivals is in place at both stores.

Many lot release certificates are not accompanying the VARs. They are however available with the clearing department, which is not easy to retrieve.

The aspects that contributed to the loss of score are :

Weaknesses

- Staff has not been trained on how to fill the VAR. In fact she has not had any formal training since taking on the responsibility since last 2 years.
- Vaccine Arrival Reports (VARs) are filled only during the receipt of the campaign vaccines, as these contain the blank VAR form,
- For other vaccines arrivals, out of 25 vaccines lots, 5 had VAR forms, but none had been filled completely
- VARs are not signed by the supervisor,

The incomplete VARs have not been noticed by UNICEF – Tanzania or Copenhagen Supply Division, which usually review them for their own reporting and consolidation.

Recommendations

- ✓ A VAR MUST be filled for each and every vaccine lot that arrives into the country and counter signed by the CVS manager and the supervisor as a mark of endorsement of its correctness and completeness.
- ✓ A copy of the VAR along with the Lot Release Certificate should be kept at the CVS, and with EPI for purposes of any follow up or inquiry.
- ✓ At least 2 CVS managers/officers MUST be included in induction and periodic training conducted for the vaccine managers, although they belong to the MSD and not EPI.

10.2 Temperature Monitoring

All vaccines are sensitive to biological substances. The higher the temperature to which the vaccine is exposed, the quicker is the loss of potency. Some vaccines are also sensitive to freezing, and this can cause irreversible damage.

In this criterion the following aspects are assessed to ensure that vaccines are stored at the recommended temperatures:

- Knowledge of the store manager with regard to the storing temperature for the different vaccines and their sensitivity to freezing.
- The quality of cold chain is systematically monitored.
- Continuous temperature records of the cold rooms and freezers rooms and refrigerated vehicles in countries where it takes more than 24 hours to deliver vaccines.
- Twice daily manual temperature recording for all equipment storing vaccines is maintained.
- The temperature records are regularly inspected and retained for auditing purposes.

The Assessment considers the 3 old WICRs and 2 WIFRs. It also takes into account the 4 new WICRs that are being used for storage of new stocks of vaccines, although these have not been handed over officially.

Findings

Vaccine Store	CVS	20 RVSs	28 DVSs	27 HFs
Score	**50%**	87%	87%	85%

There is good performance at all levels except the national level. The main reason for poor performance at the central level is indicated under weaknesses. The salient aspects are :

Strengths

- Manual temperature records are maintained at all levels. At RVS, DVS and Health facility, manual temperatures records are maintained using the Forms and chalk boards,
- The temperature record forms are safely stored for three years at most places,
- Vaccine store managers at the CVS, RVS, DVS and Health facilities know the correct storage temperatures for different vaccines.

The main causes of low scores at the central level and reduced score at other levels is:

Weaknesses

Central level:

- There has not been any temperature monitoring study in the country,
- Temperature mapping of WICRs have not been done ever, neither for the old ones, nor for the new ones,
- The old WICR and WIFRs at the CVS do not have any continuous temperature recorders.

All levels:

- The manual temperature recording form does not provide specific space for inclusion of other issues such as power-outs, defrosting or maintenance. The blank space provided for remarks is usually left unused,
- Temperature records are not reviewed during supervision, signatures of visits are not available in some regions, districts and health facilities.

  The general practice is to mark the visit in the “Book 2”, which does not necessarily provide details of

  what task were carried out.

Recommendations

Central level :

- ✓ Tanzania should conduct a temperature monitoring study based on the WHO guidelines,
- ✓ Temperature mapping should be carried out for all WICRs where vaccine are stored. The storage plan should use the information to ensure that freeze sensitive vaccines are not exposed to temperatures below 0C,
- ✓ All WICRs and WIFRs used for storing vaccines MUST have continuous temperature recorders,

  For the newly installed WICRs, the proper operation of the system of monitoring and recording should be ensured prior to the final commissioning and handing over. The recorded data should be easily transferred to hard copies directly or through computer software,

  Alternatively, a 16 or 24 channel data logger should be installed, with tele-alarm and remote reading facility, to be able to better monitor the temperatures of all the WICRs.

All levels:

- ✓ The temperature recording format needs to be revised to include specific additional information on power status, maintenance and supervisors inputs and signature. The latter will also help ensure that supervisors sign the document during reviews,
- ✓ In view of strengthening supervision, supervisors should review the records at least once a month, discuss the results with the store officer, take any corrective action if warranted and confirm their approval of proper storage through their signature on the temperature recording form,

  Special attention is needed for supervising the private clinics in where there is a high rate of turnover and staff are not trained in vaccine handling and cold chain.

  The Private Public Partnership (PPP) should include adequate supervision of the immunization services to ensure that the private clinics adhere to the recommended standards,
- ✓ All records at all levels should be kept safely for 3 years.

10.3 Capacity of Cold and Dry Storage and Transport

Capacity should be adequate for storage and transport of routine as well as campaign vaccines and the required consumables. Hence the following issues are assessed:

- ❖ Storage capacity is sufficient to accommodate maximum stock requirements for the routine immunization and its consumables, and for supplementary immunization if the same are also kept in the store
- ❖ Storage capacity is sufficient to accommodate maximum stock requirements of vaccines and consumables for all supplementary immunization at the temporary facilities if these are used for this purpose
- ❖ Transport capacity is able to meet the maximum demand
- ❖ There is sufficient number of passive containers and there is capacity to produce the required quantity of coolant as required
- ❖ Contingency plans are in place to protect the vaccines in case of any emergency.

Findings

Vaccine Store	CVS	20 RVSs	28 DVSs	27 HFs
Score	**61%**	86%	86%	89%

The assessment does not take into account the 8 new WICRs which have been installed at the national level and are awaiting official handing over, and one new WICR in the process of being installed at every region. The assessment is based on the WHO recommendation of storing 6

months plus 25% of stocks at the CVS, 3 months plus 25% stock at the RVS and DVS and 1.5 month of stock at the HFs.

At the CVS, 4 of the 8 new ones are already being used since the past 3 months, to store all new arrivals of vaccines. The 3 old WICRs are used for the previous stocks, which is being distributed. The assessment considers the storage space of the 3 old WICRs and 2 old WIFRs.

Likewise, the dry storage is planned to be shifted to the same hall as the new WICRs. The assessment has considered the current dry store located at 10 km from the CVS.

The low score at the CVS will get redressed from 61% to 78% with the handing over of the new WICRs. Note that from January 2013, when the Rota and PCV-10 vaccines are introduced, the total peak stock volume will reach 85,000 Litres, while the total storage capacity of the 8 WICRs shall be 96,000 litres. In reality however, the country will never face the situation of having peak stocks of all antigens at the same time - due to the variation in supply dates, and periodic supply to the regions.

The present performance scores are therefore due to the following strengths and weaknesses:

Strengths

- ❖ Sufficient freezing / storage capacity at the CVS with 2 old WIFRs.
- ❖ Sufficiency of space at the old dry store of CVS located at 10 km from the CVS.
- ❖ Sufficient vaccine storage capacity (+2 to +8 C) in all the RVS (except Iringa) and most of the DVS (except Mbulu, Karagwe, Kinondoni and Biharamulo), and at all HFs except (Kaniha, Rugasha),
- ❖ Sufficiency of dry storage space at most RVS, except Manyara and Kagera.

  These two RVSs will soon have a new dry stores constructed.
- ❖ Transport capacity is adequate in all regions,
- ❖ All RVSs and DVSs have adequate number of cold boxes but not WHO pre-qualified under PQS, (check with KK)
- ❖ Most staff at all levels know how to safe guard vaccines in cases of emergencies, although written guidelines are not there.

The area of concern are :

Weaknesses

Central level :

- ➢ The currently total vaccine storage capacity (at +2 to 8 C) is insufficient based on 6 months plus 25%of stock. However, this limitation will be overcome when the 8 WICRs are handed over,
- ➢ There is inadequate stock of cold boxes. Foam boxes are used for deliveries to the other zonal MSD and to the RVSs**.**

All levels :

- ➢ Inadequate storage capacities at Mbulu, Karagwe, Kinondoni and Biharamulo districts and Kaniha, Rugasha health facilities at present and in future at a few others (eg. Iramba, Rungu Maswa, Hama, Urambo, Mzenga),
- ➢ 10 districts do not have adequate dry stores.
- ➢ The transport capacity at several DVSs is inadequate, vehicles allotted from the pool are not appropriate.
- ➢ Currently there are no written guidelines or SOPs for contingency at any level.
- ➢ The emergency contact numbers are not always visibly posted in most facilities

To address the weaknesses the following recommendations are provided:

Recommendations

- ✓ Additional ice-lined refrigerators (ILRs) to be installed at all location that have shortage of space in the current situation, and at those that will face shortage with the introduction of

new vaccines,

- ✓ All transport of vaccine to be carried out using PQS qualified cold boxes, unless transport is done using refrigerated trucks.

  Ideally, keep one extra functional ILR at each DVS for emergency sake.
- ✓ Capacity building programmes should include preparation of contingency plans specific to the respective vaccine stores of the store managers,
- ✓ Staff should display the emergency numbers in a manner that makes them visible to anyone who may notice an emergency.
- ✓ In future, ensure that dry stores are within the vaccine stores with adequate space for easy abiding the bundling principle.

10.4 Status of Building, Cold Chain Equipment and Transport

The good operating conditions of the building housing the vaccine store, the equipment storing the vaccines and the vehicles that are used for transport are important aspects to ensure safety of the vaccines. The following aspects are assessed here:

- ❖ The location of the store building, the quality of construction and accessibility are satisfactory
- ❖ The building provides space for all the activities to be carried out there
- ❖ The condition of all the equipment used is satisfactory
- ❖ WICR and WIFR, ILR and DF, and generator
- ❖ The condition of transport vehicles and containers are satisfactory.

Findings

Vaccine Store	CVS	20 RVSs	28 DVSs	27 HFs
Score	**92%**	**91%**	84%	86%

The CVS is currently in the process of moving from the old to the new wing dedicated for EPI within the MSD compound which has the newly installed 8 WICRs and sufficient space for the dry store. The assessment has however considered only the old CVS and dry store at the central level.

2 Refrigerated trucks have been procured recently by the CVS and shall be put into use from July 2012.

The performance scores are attributed to the flowing strengths and challenges.

Strengths

- ❖ The Condition of buildings housing the vaccine store are in general good,

  Buildings are dedicated and accessible though shared with other programmes,

  10 districts- Lungwe, Nkasi, Ilamba,Biharamulo,Lindi,Morogoro urban,Moshi rural, Mkoani, vaccine stores are in good conditions,
- ❖ All WICRs and WIFRs were operational at the CVS,
- ❖ At the CVS, all WICRs (old as well as new) are fitted with shelves,
- ❖ All the cold chain equipment at RVS, DVS and health facilities conform to WHO/UNICEF pre-qualified guidelines,
- ❖ At the CVS, all systems are connected with the generator of MSD,
- ❖ All regions have generators,
- ❖ All regional stores have vehicles for transporting vaccines. Transport for distribution of vaccines at all DVS is also available although it is in a pool (exception DVS Korogwe whose vehicle is old),
- ❖ There is enough icepack freezing capacity, cold boxes and vaccines carriers at most levels,

- ❖ All district store keepers have proper office.

Weaknesses

- ➢ At the CVS the new WICRs do not have the continuous temperature recording units on operation although vaccines are already stored in 4 of the 8 WICRs.
- ➢ Several vaccine store building are in poor condition (eg. Moshi, Rungwe, Nkasi, Rudewa, Arusha, Korogwe, Urambo)

  22 out of 27 district dry stores are in poor condition: Rudewa and Masasi are improvised stores. Some dry stores are improvised in the containers (eg. Tarime) and at Arusha municipal store LP gas cylinders are kept within the facility.
- ➢ 23 ILRs and 4 deep freezers (DFs) awaiting repair,
- ➢ 23 old and beyond repair equipment awaiting disposal are kept in some DVS and thereby creating congestion in the room.
- ➢ Several RVSs, DVSs and HFs lack sufficient numbers of voltage stabilizers,
- ➢ 7 vaccines stores do not have generators or the generator is not connected to vaccine store: Morogoro, Arusha,Nkasi, Karagwe, Nzega, Songea, Arusha municipal,
- ➢ 11 regions and 16 DVS do not have fire extinguishers, or if present have not been serviced. Staff do not know how to operate them,
- ➢ Insulated boxes which come together with vaccines from manufacturers were being used at RVS and DVS instead of cold boxes as recommended by WHO/UNICEF for transportation of vaccines.
- ➢

Recommendations

- ✓ Several RVS / DVS vaccines or dry stores will need improvement,
- ✓ All WICRs and WIFRs used for storing vaccines, MUST be equipped with continuous temperature recorders / data loggers and an acoustic / audible alarm.
- ✓ The guidelines on proper storage of gas cylinders outside the dry storage, need to be enforced,
- ✓ Share the vaccine distribution plan with the CHMT / DHMT for better coordination of vehicles to DVS level.
- ✓ All unwanted / non-usable items should be kept out of the vaccine and dry stores. A space should be dedicated for such items while awaiting disposal.

  Ensure speedy disposal of condemned equipment before it causes too much clutter
- ✓ Ensure that every electrical cold chain equipment is connected to a separate voltage stabilizer.
- ✓ For safety purpose, all fire extinguishers should be serviced / recharged once a year.

  They should be placed close to every entrance in a visible manner.

  Staff should be trained on how to use the extinguishers.

Aspects related for Future:

- ➢ At the CVS, 1 of the 8 new WICRs needs to be installed with acoustic alarm
- ➢ In future, when new WIFRs are purchased for the CVS to replace the present ones, they should be installed along with the new WICRs.

10.5 Maintenance and Repair

For ensuring a sustainable safety of the vaccines, the building, equipment and transport vehicles need to be maintained and upgraded periodically. Hence it is important to ensure that:

- A periodic preventive maintenance plan for building, equipment and vehicles is in place and being implemented,
- An arrangement is in place to carry out prompt repairs of equipment and vehicles in case of any failures.

The maintenance of the buildings fall under the jurisdiction of the regional and district authorities. For the maintenance of cold chain equipment, several RCCOs and DCCOs were trained for maintenance and repair and equipped with tool kits. However, many of them have since been promoted from their posts. The majority of RCCOs and DCCOs can carry out general maintenance, but are not trained to conduct major repairs.

Findings

Vaccine Store	CVS	20 RVSs	28 DVSs	27 HFs
Score	85%	**94%**	88%	89%

All the scores are greater than the WHO recommended 80% with RVSs having an even better performance. The key contributors are mentioned below.

Strengths

- Regional and district authorities have plans to maintain government institutions. In general all the buildings (exception RVS Lindi) are in good condition,

  Lindi is currently located in the temporary facility and will get to the new office after completion of the renovation within 3 months,
- Preventive Maintenance plans exist in the form of guidelines are there in the documents and training materials.
- Planned replacement and preventive maintenance for cold chain equipment is carried out:

  At the CVS, an outsourced agency is engaged to carry out the preventive maintenance and repair under the supervision of an engineer of MSD,

  At RVS and DVS, the maintenance is carried out by the RCCOs and DCCOs,
- Some of the RCCOs have also been trained to carry out repairing tasks as well and equipped with tool kits,
- Transport vehicles are maintained at CVS, regions and districts,
- No distribution was affected due to failure of transport,

Weaknesses

- Private facilities are not maintained as these are in rented locations (eg Neema, Darajani.)
- Some of the RCCOs who were trained in technical repairs have been shifted to other services and are no longer available for this service.

Recommendations

- ✓ As mentioned before, MoH should supervise the condition of the private clinics which are providing immunization services. Negligence on general maintenance may affect the immunization programme on the long run,
- ✓ Every district should ensure that one technical staff is appointed for maintenance of cold chain equipment through the CHMT/ DHMT. He appointed staff should be given training on cold chain maintenance and repair periodically.

10.6 Stock Management System & Procedures

In order to maintain the quality of vaccines and consumables throughout the cold chain, it is essential to keep complete and accurate records of all stocks and their transactions. A stock control system comprises of several steps, each of which must be performed regularly, accurately and completely. The various steps are checking and recording details of the consignments or stocks:

1) When they arrive, 2) During their storage and 3) When they leave the storage point for distribution and finally 4) In case any vaccine is damaged or expired.

Here the following issues are assessed:

- A standardized recording and reporting system, preferably computerized at the primary level is in place and is being followed
- All lots/batch numbers of vaccines, diluents and consumable have been recorded at the time of arrival, distribution and dispatch along with all their salient parameters
- Stocks of vaccines and diluents are maintained between maximum and safety (buffer) stock levels
- Periodic physical inventories is conducted
- Proper requisition and receipt forms are in place
- Good warehouse practices are followed
- Deliveries are made following Early Expiry First Out (EEFO)
- Storekeepers know when to over ride EEFO based on VVM status
- Standard recording system is in place to safely dispose of damaged or expired stock
- All Stocks and records are safe.

Findings

Vaccine Store	CVS	20 RVSs	28 DVSs	27 HFs
Score	82%	**94%**	86%	79%

Here again all the levels are performing well, with the RVS having the highest score.

Strengths

- The stock management records are maintained well. WHO's Stock Management Tool (SMT) is used for the stock management at national, regional level and the DVD-MT is used at the district level, which consolidates the information of the HFs. Hence most of the required parameters for vaccines and diluents are recorded.
- Reports generated from the SMT are reviewed monthly for monitoring at all levels,
- A standard requisition form is used by the lower stores to request vaccines and supplies. The form contains columns for the peak stock, balance in hand, and what is ordered. Along side is the column for quantities issues and comments. The form lacks space of VVM status.
- Maximum and minimum stocks are defined in the STM, and used for ordering,
- At the CVS, RVS and DVS, there is an issue voucher for every requisition. At CVS and RVS the entries are done in the SMT while at DVS they are done in the ledger book,
- All store managers follow the EEFO with attention to the status of VVM,
- Freeze tags are used along with freeze sensitive vaccines during storage at all levels.
- All stock records are kept securely for 3 years at all levels.
- Staff is knowledgeable on how to handle damaged vaccines. Disposal of wasted / damaged vials is carried out through incineration after following the standard waste management procedures.
- Physical inventories are periodically carried out at all levels. Stocks are matching.

Diluents match with vaccines except in 6 RVSs and 7 DVSs,

- ❖ Warehouse practices are good at all levels. .
- ❖ No vaccines have been damaged due to poor storage. Although some Pentavalent vials in stage two of VVM were observed in Rukwa region.

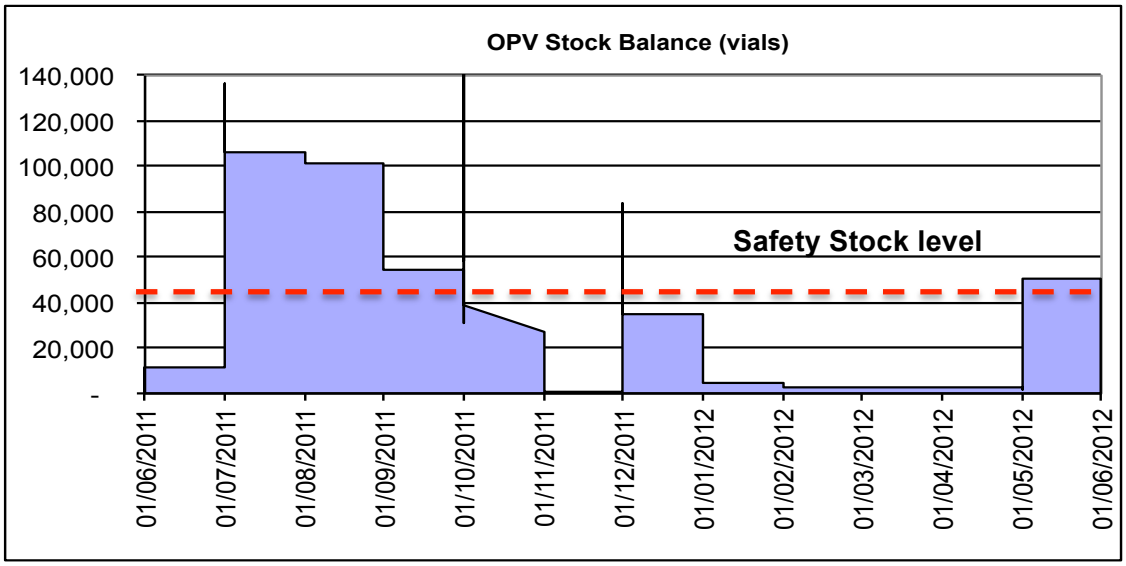
Weaknesses

Central level :

- ➢ The computer system is slow. Verification of data on the system was difficult during assessment due to its slowness.
- ➢ There has been shortage of BCG in April and OPV in November 2011 and again in January 2012. As a result, there were short shipments and stock out of OPV at national level and regional level (eg. Shinyaga).

  Breach of safety stocks observed at some places (eg. Ruvuma for BCG and OPV).

Figure 4. Stock balance of OPV over the assessment period



- ➢ The actual physical stock of BCG is less than the stock on record. The stock of diluents is more than that on record.
- ➢ BCG vaccines were out of stock from 30 April to 31 May in 2012. There was short supply in the last delivery. Delay in the delivery was reported due to delay in release of funding.

All levels:

- ➢ Manual vaccine stock books at some DVSs and health facilities do not record batch numbers, manufacturers and VVM status.
- ➢ The requisition form has the names of the vaccines printed on it, but not that of the diluents and other ancillary materials.
- ➢ The status of VVM status are not always recorded in the issue vouchers during issue of vaccines
- ➢ Two districts do not record injection materials, Kilosa, Kinondoni.

Recommendations

- ✓ The Ministry should ensure timely release of funds to ensure an interrupted supply of vaccines for the immunization programme. A provision of a buffer fund should be made to take care of any unexpected delays in releasing of funds,
- ✓ The CVS manager needs an adequate computer system that is capable to run the STM and work in an efficient manner,
- ✓ The format of the requisition form should be revised to include the diluents, and all the ancillary items, so that the health staff can ensure that none of the items are omitted during placing of an order,

- ✓ SMT has an issue voucher. The national, regional and district stores should make use of the standard issue voucher produced by the SMT if not available in the government system.

  Alternatively the standard voucher should be improved to include the status of VVM upon issue and receipt,

  Staff MUST mark the status of VVM during issue,
- ✓ Staffs need to take more caution during stock management and distribution to ensure that there is always good match between vaccines and diluent stocks,
- ✓ Staff should be trained to ensure proper recording of all vaccines and injection items with their important information in the ledger at the DVS ad HF levels.

10.7 Effective Distribution

For an effective immunization programme, timely deliveries of the required quantities of vaccines are important. The parameters assessed here ensure the effectiveness of the vaccine distribution between each level of the supply chain. These are:

- ❖ The vaccine distribution programme is planned and implemented in timely fashion,
- ❖ A system to manage short shipment is in place,
- ❖ Vaccines are correctly packed during transport,
- ❖ Freeze indicators are used correctly to monitor the quality of the transport,
- ❖ In case of damage to the vaccine during transport, a system is in place to take corrective action effectively.

Findings

Vaccine Store	CVS	20 RVSs	28 DVSs	27 HFs
Score	**34%**	82%	79%	96%

The performance score is good at all levels except the central one. The key reasons for this drop is listed in the weaknesses. The achievements at most levels is attributed to the following strengths.

Strengths

- ❖ Distribution plan exist at most RVS and DVS, since a route matrix is used for planning the distribution of vaccines and obtaining the funds for it. The basic plan is available and generally informed to the lower level, with few exceptions.
- ❖ Most staff are conducting proper conditioning of ice pack before use.
- ❖ RCCOs accompany the distribution vehicle at regions and DCCO at districts or the health facility staff accompanies the vehicle when collecting vaccines.
- ❖ No vaccines have been lost due to problems of transport at any level.

Weaknesses

The dramatic fall of performance score at the central level is due to the following two reasons :

- ➢ There is no distribution programme. The pull system is adopted. Distribution is planned based on demands from the RVSs.
- ➢ For deliveries from the CVS / MSD, the drivers are informed of whom to call in case of emergency. No one from the CVS accompanies the vehicles during delivery, and the drivers have no special training on handling of vaccines.

Other weaknesses at all levels are :

- ➢ Some RVS (eg. Iringa) and DVS (eg. Kinondoni, Korogwe) did not share their distribution plans with lower level,
- ➢ There were instances of short-shipments of BCG and OPV, resulting due to the shortage at the central level,

- Several districts have to share pooled vehicles, and hence at times are not the suitable for vaccine transport (uncovered vans) ,
- Staff have incorrect knowledge of packing of a cold box, they tend to use non-standard ice packs at all levels that do not fit well in cold boxes,
- Freeze indicators are required during transportation of vaccines but these are not implemented except at very few places at present (eg. Shinyanga region, Singida).
- The status of VVM (as well as Freeze indicators) are not recorded in the issue voucher upon receipt.
- Knowledge of ice pack conditioning is shaky for some staff.
- Transport contingency plans are not available at any level

Recommendations

- ✓ The CVS manager should inform the RVS manager of the status of dispatch when the consignment is handed over to the loading section of the MSD, and further update him when the vehicles leaves with expected date and time of arrival.
- ✓ The officers of the transport division of the MSD should be sensitised to the importance and vulnerability of all immunization material.
- ✓ MoH should purchase more Freeze Indicators and supply them to every store for use during transportation of freeze sensitive vaccines.

  Sending and Receiving facilities should ensure that freeze tags are used and receiving stores to ensure that the same are returned to a sender.

  In case there is an alarm, the store manager either of same or of the upper level should go and conduct shake test.
- ✓ All DVSs should record the status of VVM upon receiving vaccines at the store on the issue voucher and return the voucher to the RVS or CVS to the person who delivered the vaccines. RVS should send a copy to IVD.
- ✓ Capacity building programmes should include revision on correct methods of ice pack conditioning and packing of ice pack in a cold box.
- ✓ Each districts MUST have a specific adequate vehicle available for vaccine supply within its pool of vehicles. Priority should be given for all vaccine and associated distribution .

10.8 Appropriate Vaccine Management Policies and Practices

This criterion is essentially applied to the service delivery level. Only 6 out of 16 questions are applied at the CVS, RVS and DVS. For the proper Vaccine Management and handling several parameters are assessed:

- ❖ Knowledge and proper use of VVM and shake test by the staff,
- ❖ The freeze dried vaccines and their corresponding diluents are correctly ordered, received, stored and distributed,
- ❖ Lyophilized vaccines are always reconstituted with diluents from the same manufacturers,
- ❖ Diluents are maintained at +2 to +8^{o}C, same as the vaccine before reconstitution,
- ❖ The reconstituted vaccines are discarded within 6 hours of reconstitution or at the end of each immunization session, whichever comes first.
- ❖ The MDVP is implemented correctly.
- ❖ A vaccine wastage monitoring system should be in place:
- ❖ Reporting forms are used to monitor vaccine wastage,
- ❖ Wastage data can be used to make necessary corrections when re-ordering vaccines. The information can be used to reduce wastage in future,
- ❖ Existence of regular supportive supervision.
- ❖ There must be an effective system for disposal of used sharps and vials.

Findings

Vaccine Store	CVS	20 RVSs	28 DVSs	27 HFs
Score	77%	**90%**	**90%**	**93%**

The performance score is almost good at the CVS and very good for the other levels.

Strengths

- ❖ Standard forms are used for recording wastage. Data from health facilities is systematically received and collated at the districts using the DVD-MT. This is then sent to the regional level which, in turn sends it to the central level.
- ❖ At all levels the store managers are knowledgeable about VVM and are using it for correct vaccine management.
- ❖ Multi Dose Vial Policy (MDVP) in use and well understood at all levels
- ❖ Diluents are kept at recommended temperatures before reconstitution at health facility levels.
- ❖ Reconstituted lyophilized vaccines are discarded at 6 hours or at the end of the session, whichever comes first although practically immunization sessions last less than 6 hours.
- ❖ Standard forms are available and used for recording of wastage. Data is systematically received from Districts - which collates information from health facilities, and then this is entered into the DVD-MT.

  This data is used for forecasting and monitoring performance.
- ❖ Supportive supervision is conducted regularly.

Weaknesses

- ➢ Many of the store managers at all levels, lack knowledge on shake test.

  Even at the CVS, the Store manager is in post since 2 years but has had no formal training. She has been trained on the job by former assistant who was trained in 2007 on vaccine management tools.

  Likewise at RVS Tabora, Mara, and 11 DVS. At HF shake test is also problematic.
- ➢ The practice of noting the date on an opened vial of liquid vaccines is not implemented in all facilities.
- ➢ Supervisors tend to mark their visits in book 2 during the visits and not on all documents they have verified.

Recommendations

- ✓ Conduct practical exercises of shake test during training workshops for staff to get confidence in shake test methodology.
- ✓ Staff MUST mark the vials of liquid vaccines with the date at the time of opening.
- ✓ Supervisors should always endorse their visits by signing on each and every documents verified by them.

10.9 MIS and Supportive Management Functions

This criterion is essentially applicable at the national vaccine store level. Only 4 out of 18 questions apply at the RVS and DVS level. It is not applicable and therefore not scored for the health facility level, although it is marked as 0 in the spider graph.

The aspects evaluated here are:

- Standard Operating Procedures are in place,
- Field data is collected and the same are used for programme management purpose,
- An annual work plan is in place,
- Out-sourced services are fully funded and resourced.

Findings

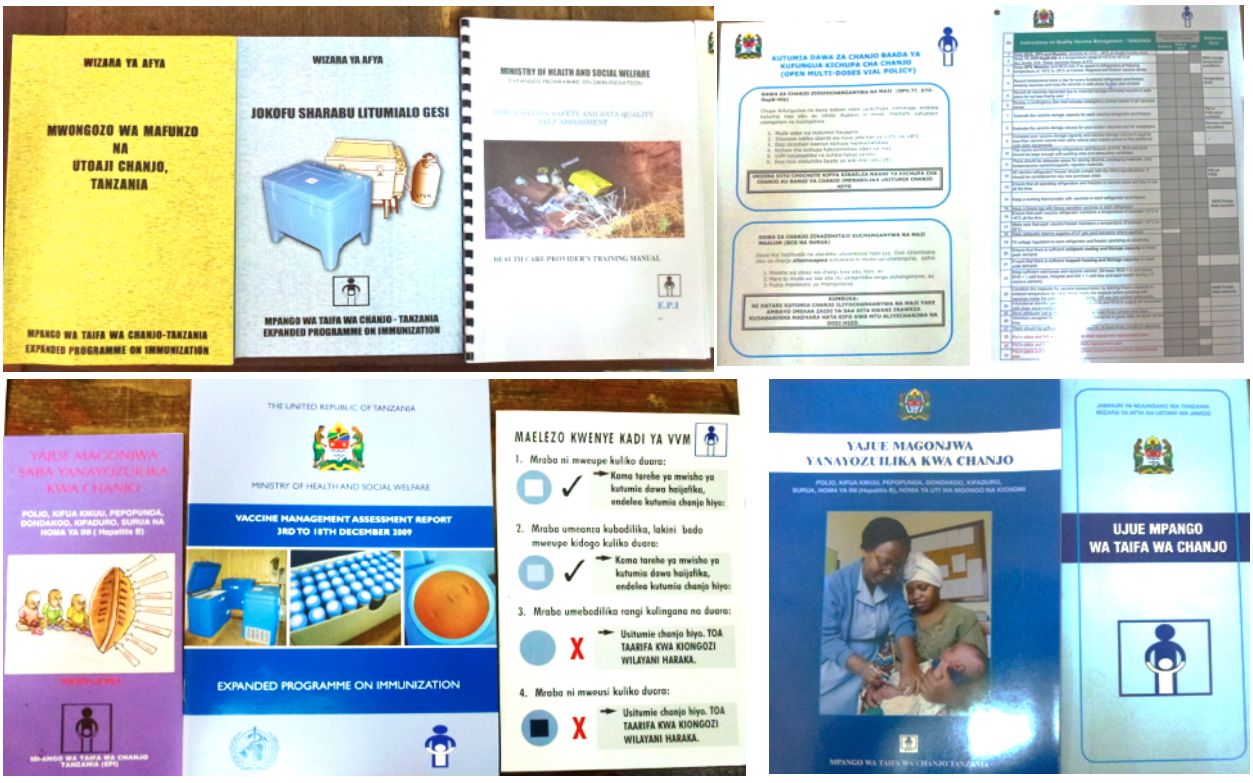
Vaccine Store	CVS	20 RVSs	28 DVSs	27 HFs
Score	**96%**	**100%**	**99%**	NA

This indicator has excellent performance at all levels. It does not apply at HF level.

Strengths

- The following guidelines, documents, training materials have been developed and circulated for the immunization services. These are common for the United Republic of Tanzania.

Figure 5. Guidelines and training materials developed by the Republic of Tanzania



- Training handbook for immunization services of Tanzania (2004 – in Swahili)
- Absorption refrigerator using LPG (2004 in Swahili)
- Immunization safety and data quality self-assessment (2005 ?)
- Instruction for Quality Vaccine Management – Tanzania (2008 and 2010-Implementation guidelines list from VMA 2007 in English and VMA 2009 in Swahili respectively)

- Prevention of vaccine preventable diseases (2010)
- Prevention of vaccine preventable diseases (leaflet of 2010)
- Understanding national immunization programme - Leaflet with new Schedule including the new vaccines to be introduced in 2013.
- Open Multi-dose Vial Policy (Sticker) (Swahili)
- VVM sticker (Swahili)
- Fridge tag users guide – (2010- in Swahili)

- The supporting documents are updated regularly as per the needs and are in consonance with WHO materials.
- Standard WHO and UNICEF tools are used for forecasting vaccines and injection devices. Wastage rates collected from the field thorough standard forms, and consolidated at upper levels are used for the evaluation.
- The census of 2002 population figures are projected and wastage rates from field are collected and consolidated and are used for forecasting.
- DVD-MT and hard copies are used to record children vaccinated, vaccines and injection materials usage and wastage rates.
- Wastage rates have been used to steer the programme, by identifying the specific regions with unusual wastage for follow up through guidance.
- The MSD has inventory of all its vehicles and EPI has an inventory of EPI vehicles and equipment
- There is a MOU contract for outsourcing equipment servicing and repair.
- The work plan and budget covers the spare parts required for equipment maintenance.

Weaknesses

- SOPs are not available with the store manager, nor are they readily available at some RVSs ,DVSs and health facilities,
- The vaccine store manager at the CVS has not had any formal training.

Recommendations

- ✓ The National level staff should be provided with a comprehensive training in vaccine management and cold chain logistics.
- ✓ Written and clear SOPs should be developed and made available at each levels.

11. The immunization supply chain requirement for future programme needs

11.1 NUVI plan and anticipated changes

The revised plan of immunization schedule based on the introduction of new vaccines is given in the table below. Vaccines to be introduced form January 2013 are marked in blue italics.

Table 9. Immunization Schedule with current and new vaccines

Vaccine	Age				
	Birth	6 weeks	10 weeks	14 weeks	9 months
BCG	x				
Oral polio Vaccine (OPV)	x	x	x	x	
DPT-HepB-Hib (Pentavalent)		x	x	x	
Pneumococcal Conjugate Vaccine (PCV-10)		*x*	*x*	*x*	
Rotavirus		*x*	*x*		
Measles					x

As mentioned earlier, a bank of 8 new WICRs are ready to be commissioned and handed over to the EPI at the MSD. One WICR is in the process of being installed at every region and 3 districts of Dar-Es-Salaam. Additional ILRs are being procured to enhance the cold chain capacity of districts.

11.2 Infrastructure expansion requirement by level

Pls refer to Annex. E

12. EVM improvement plan

12.1 Key priority areas and targets for improvement

The key recommendations are separated into different categories: Management, documentation, equipment, capacity building and practices.

The priority is defined as :

1: immediately, and no later than 3 months

2: within the next 6 months

3: within 12 months.

Management

#	Priority	Action	Expected result
1	1	Include the vaccine store managers of CVS in induction and periodic training conducted for the vaccine managers.	At least 2 CVS staff well trained
2	2	Ensure an interrupted supply and stock of vaccines by timely released of required funds. Preferably, make provision of a financial buffer to take care of any unexpected delays in releasing of funds,	Uninterrupted supply of vaccines, zero stock-outs.
3	3	Conduct a temperature monitoring study	Study results obtained for

#	Priority	Action	Expected result
		based on the WHO guidelines	improving the system.
4	1	All new WICRs should be commissioned rapidly and handed over for use by the EPI.	All Cold rooms mapped and records available.
5	1	Proper distribution plans and related communication should be established between CVS and RVSs. It should not depend on drivers alone,	Distribution plans established between CVS and RVSs.
6	2	Several RVS / DVS vaccines or dry stores need improvement, or proper allocation of building space,	Adequate building and space allocated to all RVS and DVS currently having problems.
7	2	Every district should ensure that one technical staff is appointed for maintenance of cold chain equipment through the CHMT/ DHMT.	One technical staff available for service ad repair in each district.
8	2	All unwanted / non-usable items should be kept out of the vaccine and dry stores. A space should be dedicated for such items while awaiting disposal.	No clutter of un-usable equipment in the EPI stores.

Documentation

#	Priority	Action	Expected result
1	1	Improve the standard formats for : temperature recording form, requisition form, and issue form include all relevant parameters that need to be recorded.	Revised Standardized forms are available at all levels and are used.

Equipment

#	Priority	Action	Expected result
1	**2**	Procure more freeze Indicators and supply them to every store for use during transportation of all freeze sensitive vaccines.	Freeze tags are used during every transport of freeze sensitive vaccines and status recorded in issue vouchers.
2	2	All WICRs and WIFRs used for storing vaccines MUST have continuous temperature recorders,	All WICRs and WIFs have a continuous temperature record in form of soft / hard copy.
3	2	Additional ice-lined refrigerators (ILRs) to be installed at all location that have shortage of space in the current situation, and at those that will face shortage with the introduction of new vaccines,	Every DVS is equipped with sufficient storage capacity for introduction of new vaccines for 3 months plus 25% of peak stock.
4	2	Ensure provision of voltage stabilizers where required,	Every equipment has a voltage stabilizer
4	2	Ensure provision of generators where required,	Every RVS and DVS have generator backup

Capacity Building

#	Priority	Action	Expected result
1	1	Correct methods of ice pack conditioning, packing of ice pack in a cold box, marking of date when opening a vial of liquid vaccines, carry out practical exercises of shake test, and developing of contingency plans.	All staff are updated on correct practices. Each vaccine store has a contingency plan adopted for its environment.

Improvement of Practices

#	Priority	Action	Expected result
1	1	Improve supportive supervision. Supervisors to sign on all relevant document	All relevant documents signed after visits. Fewer gaps in staff knowledge and practice.
2	1	Proper filling of the VAR by the CVS manager, A copy to be kept at the CVS with the LRC.	One VAR for every vaccine arrival sent timely to UNICEF, and a copy with LRC at the CVS and IVD.
3	1	All activities associated with the cold chain equipment on the temperature recording form,	Information of maintenance, defrosting, power outs, repair included in the form.
4	1	Complete details of all items in the requisition form,	Every item needed for the immunization programme included.
5	1	Noting the VVM status during issue and receipt of vaccines in the issue vouchers,	Status of VVM noted for easy follow up.
6	1	Conducting proper physical inventories to keep mismatches low,	Mismatch between records and actual stock, reduced to 0.
7	1	Use of PQS qualified cold boxes for all vaccines transport.	Foam boxes never be used for transportation of vaccines.
8	2	Improve supervision of private clinics	Condition and performance of private clinics at par with the Govt. buildings and services.

12.2 Improvement plan

The country will prepare the improvement plan based on all the above mentioned recommendations later.

13. On-going efforts (optional)

A series of recommendations were generated to improve the cold chain and vaccine management after the Vaccine Management Assessment of 2009. These were divided into 4 levels. The table below gives the summary of the status of these recommendations as of June 2012. The present good results are result of having implemented 71% fully and 13% partially.

Table 10. Status of recommendations of 2009 VMA.

Level	Total No.	Fully complied	Partially complied	Not complied
MOHSW	**12**	9	2	1
MSD-CVS	**7**	4	0	3
RVS-DVS	**12**	9	2	1
Total	**31**	**22**	**4**	**5**
Total %		**71%**	**13%**	**16%**

14. Conclusion and next steps

Tanzania has achieved an overall commendable performance of 85%. The results of different level indicate that the CVS store is weakest link of the supply chain with three of the indicators achieving performance score less than 70%. Specific attention needs to be attributed to address the concerns detailed in the findings, and the recommendations provided followed.

The performance of the regional, district and health facilities is greater than the recommended score of 80%.

A set of key priority areas and targets for improvement have been specified in section 12. Additional recommendations are provided in the details of performance for each indicator.

The country is urged to implement them to remove the existing weaknesses and reach an even more commendable performance.

15. Annexes

A - List of participants / assessors for the EVM Training

TRAINING OF EVM ASSESSMENT TOOLS - 28TH MAY - 1ST JUNE, 2012					
No	Name	Designation	Station	Mobile No:	E-mail Address
1	Abasi Hincha	RIVO	Health - Pwani	0718 049 000	abbas_hincha@yahoo.com
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3	Acton Mwaikemwa	SO/IVD	MOHSW - IVD	0756 775 085	amwaikemwa@yahoo.com
4	Anthony Kazoka	IVD - SO	WHO - Lake Zone	0767 900 256	kazokaa@tz.afro.who.int
5	Antipas Kyara	RHO	Kilimanjaro	0754 443 927	anthipaskyara@yahoo.com
6	Boniphace Makelemo	IVD- SO	WHO - Iringa	0763 353 635	makelemob@tz.afro.who.int
7	Bumija A. Mhando	RHO	Tabora	0754 311 650	bumijam@yahoo.com
8	Chris Kamugisha	IVD Team Leader	WHO	0756 959 547	kamugisha@tz.afro.who.ink
9	Delphinus Mujuni	Data Manager	MOHSW - IVD	0784 514 616	ruge2002@yahoo.com
10	Dr. Daudi Manyanga	SO/IVD	MOHSW - IVD	0713 666 676	dpmanyanga@yahoo.co.uk
11	Dr. Pamphil Silayo	PO- IVD	UNICEF	0783 749 563	psilayo@unice.org
12	Dr. Zebadia Lauwo	Imm. Tech. Officer	JSI/MCHIP	0754 366 556	zlauwo@jsi.co.tz
13	Edward Ganja	RHO	Health - Dodoma	0754 991 963	edisega@yahoo.com
14	Fikiri Mazige	Tutor	PHC I - Iringa	0767 283 535	mazigef@gmail
15	Fulgence Temu	DIVO	Health Mpwapwa	0784 474 160	temuson@gmail.com
16	Hashim Abdalla	Administrato r	Zanzibar	0777 919 776	kunambi2002@hotmail.com
17	Kabelwa Kagaruki	Imm. Logisctis Officer	MCHIP-JSI DSM	0755 072 212	kabelwakagaruki@yahoo.com
18	Khatib J. Khatib	Health Officer	Pemba - Zanzibar	0773 059 955	jkhatib2001@yahoo.com
19	Raphael Njongo	RHO	Kigoma	0762 780 272	raphaelnjongo@yahoo.com
20	Raphel Nshungu	Imm.Comm. Officer	MCHIP-JSI DSM	0784 304 263	nshungu@jis.co.tz
21	William Msirikale	Logistic Officer	MOHSW - IVD	0756 775 112	wmsirikale@yahoo.com
22	Yussuf Makame	EPI Coodinator	EPI - Zanzibar	0777 422 021	yussufhaji2002@yahoo.co.uk
23	Zebina Msumi	Training Officer	MOHSW - IVD	0755 292 629	zebina2005@yahoo.com
24	Moussa Valle	Temporary Advisor	WHO	+265 09999 35457	vallemjm@yahoo.co.uk
25	DR. Kshem Prasad	Consultant	WHO	0762 118 443	kshem@apt-progress.org

B - Pre and post-course performance matrix

Pre-Course Performance Matrix

Participant number

Cat	Qn	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Result
gen	1																									79%
	2																									
	3																									
	4																									
1	5																									94%
	6																									
	7																									
2	8																									59%
	9																									
	10																									
	11																									
3	12																									38%
	13																									
4	14																									91%
	15																									
	16																									
	17																									
5	18																									92%
	19																									
6	20																									92%
	21																									
	22																									
7	23																									63%
	24																									
8	25																									67%
	26																									
	27																									
9	28																									74%
	29																									
	30																									
																										75%

Post-Course Performance Matrix

Participant number

Qn	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Result
1																									86%
2																									
3																									
4																									
5																									96%
6																									
7																									
8																									91%
9																									
10																									
11																									
12																									88%
13																									
14																									99%
15																									
16																									
17																									
18																									98%
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20																									97%
21																									
22																									
23																									98%
24																									
25																									97%
26																									
27																									
28																									96%
29																									
30																									
																									95%

C - List of Assessors and the sites assessed

EVM ASSESSORS and Assessment sites				
No	**Name**	**Region**	**District**	**Health Facility**
0	Dafrossa, Akim, Msirikale, Kshem	Dar es Salaam - CVS		
	Yusuf, Kshem	Zanzibar - CVS		
1	Msirikale and Dafrossa	Tanga	Korogwe	Mpale
2	Akim and Abdul Saleh	In DAR	Ilala	Airport Dispensary
		In DAR	Kinondoni	Neema
3	Acton Mwaikemwa	Morogoro	Morogoro U	K/Maternity
			Kilosa	Magomemi
4	Delphinus Mujuni	Mtwara	Masasi	Mukomaindo
		Pwani		
5	Abasi Hincha	Lindi	Lindi R	Mvuleni
6	Anthony Kazoka	Ruvuma	Songea U	Ndilimalimatembo
7	Zebina Msumi	Iringa	Ludewa	Lugarawa
8	Daudi Manyanga	Rukwa	Nkasi	Utinta
9	Edward Ganja	Mbeya	Rungwe	Kisa
10	Pamphil Silayo	Kigoma	Kigoma R	Mganza
11	Raphael Njongo	Kagera	Karagwe	Rugasha
			Biharamulo	Kaniha
12	Kabelwa Kagaruki	Mara	Tarime	2000 Gwitiriyo
			Bunda	Bulamba
13	Bumija Mhando	Mwanza	Magu	Ijinga
			Sengerema	Lushamba
14	Antipas Kyara	Shinyanga	Maswa	Jija
			Kahama	Mbulu
15	Zebadia Lauwo	Manyara	Mbulu	Dirim
16	Fulgence Temu	Arusha	Arusha M	Darajani
17	Fikiri Mazige	Kilimanjaro	Moshi R	Kibo
18	Boniphace Makelemo	Tabora	Urambo	Kaliua
			Nzega	Miguwa
19	Chris Kamugisha	Singida	Iramba	Kikonge
20	Khatib J. Khatib	Unguja	West and North	Kiembe Samaki & Kitope
21	Hashim Abdalla	Pemba	Mkoani and Wete	Kiwani & Junguni

D - Cold Chain Inventory (June 2012)

Sn	District / RVS	New WICRs			ILRs and Refrigerators at RVSs ad DVSs						
					TCW 1152	TCW 3000	MF 304	SB 300	SIBIR V240 EK	SIBIR 170 EG	MK 304/ MK 302
	Capacity	**4.5**	**9**	**12**	**169**	**127**	**264**		**108**	**55**	**108**
	Unit	**M3**	**M3**	**M3**	**L**	**L**	**L**	**L**	**L**	**L**	**L**
1	Kondoa						4		3		
2	Mpwapwa				1	1	2		3	1	
3	Kongwa					1	2			1	
4	Chamwino				1	2					
5	Bahi				1	1	1				
6	Dodoma (M)				1	2	2			1	
	RVS			**1**	3	4	2				
	DODOMA - TOTAL			**1**	**7**	**11**	**13**		**6**	**3**	
7	Monduli				1		3				
8	Meru				1		2			2	1
9	Arusha DC					2					1
10	Arusha Mun				1	3	5			1	
11	Longido					2			3		
12	Karatu				2	2	1		2		
13	Ngorongoro					1	1		2	1	
	RVS		**1**		4	1	3	1			
	ARUSHA - TOTAL		**1**		**9**	**11**	**15**	**1**	**7**	**4**	**2**
14	Rombo				1	1	3			2	
15	Mwanga				1	1	3			1	
16	Same				1	1	3			2	
17	Moshi (V)						3			2	
18	Hai				1	1	3			2	
19	Moshi (M)				1		3			1	
20	Siha						1			1	
	RVS		**1**		7	2	2				
	KILIMANJARO - TOTAL		**1**		**12**	**6**	**21**			**11**	
21	Lushoto				1		2			2	
22	Korogwe DC				1	1	1				
23	Korogwe TC					2					
24	Mkinga					2					
25	Muheza						2			2	
26	Tanga				1		4				
27	Pangani						1			2	2
28	Handeni				1	1	3				
29	Kilindi					2				2	
	RVS		**1**		1	2	1				2
	TANGA - TOTAL		**1**		**5**	**10**	**14**			**8**	**4**
30	Kilosa				3		2				1
31	Morogoro (V)				1		1		1		
32	Mvomero				2	1	2				
33	Kilombero				2	3	2		1		
34	Ulanga				2	1	2				
35	Morogoro (M)				2		1		2		
	RVS			**1**		4	1			2	
	MOROGORO - TOTAL			**1**	**12**	**9**	**11**		**4**	**2**	**1**

Sn	District / RVS	New WICRs			ILRs and Refrigerators at RVSs ad DVSs						
					TCW 1152	TCW 3000	MF 304	SB 300	SIBIR V240 EK	SIBIR 170 EG	MK 304/ MK 302
	Capacity	**4.5**	**9**	**12**	**169**	**127**	**264**		**108**	**55**	**108**
	Unit	**M3**	**M3**	**M3**	**L**	**L**	**L**	**L**	**L**	**L**	**L**
36	Bagamoyo					1	2			1	
37	Kibaha TC					2				2	
38	Kibaha DC					1	1			1	1
39	Kisarawe				2					3	
40	Mkuranga				1	1	2			3	
41	Rufiji				1	1	2		1		
42	Mafia				1		3			3	
	RVS		**1**		1	5	3				1
	PWANI - TOTAL		**1**		**6**	**11**	**13**		**1**	**13**	**2**
43	Kinondoni		1			4	1				
44	Ilala		1		3	4					
45	Temeke		1		2	1					
	DAR ES SALAAM - TOTAL		**3**		**5**	**9**	**1**				
46	Kilwa					1	1			1	1
47	Lindi (V)				1	2	2		2		
48	Ruangwa				1	2	1				
49	Nachingwea				1	1	3				
50	Liwale				1	1	2			1	
51	Lindi (M)				1	1	3				1
	RVS		**1**		2	2	2				
	LINDI - TOTAL		**1**		**7**	**10**	**14**		**2**	**2**	**2**
52	Mtwara (V)					1				1	
53	Newala					1	3				
54	Tandahimba				3	2					
55	Masasi				2		2				
56	Mtwara (M)				1					1	
57	Nanyumbu					1					
	RVS		**1**		3	1	3				
	MTWARA - TOTAL		**1**		**9**	**6**	**8**			**2**	
58	Tunduru				1	1	2			2	
59	Songea (V)				1	1	3			1	
60	Namtumbo					3	3			3	
61	Mbinga					1	4		1	1	
62	Songea (M)				1	1	1			1	
	RVS		**1**		2	6	1	1		1	3
	RUVUMA - TOTAL		**1**		**5**	**13**	**14**	**1**	**1**	**9**	**3**
63	Iringa (V)				1	1	2				
64	Kilolo					1	2		1	1	
65	Mufindi					1	2			1	
66	Makete					1	3			2	
67	Njombe TC					1	2			1	
68	Njombe DC				1		2			2	
69	Ludewa				1	1	1		1	1	
70	Iringa (M)					1	2			1	
	RVS		**1**		3	1	4				
	IRINGA - TOTAL		**1**		**6**	**8**	**20**		**2**	**9**	

Sn	District / RVS	New WICRs			ILRs and Refrigerators at RVSs ad DVSs						
					TCW 1152	TCW 3000	MF 304	SB 300	SIBIR V240 EK	SIBIR 170 EG	MK 304/ MK 302
	Capacity	**4.5**	**9**	**12**	**169**	**127**	**264**		**108**	**55**	**108**
	Unit	**M3**	**M3**	**M3**	**L**	**L**	**L**	**L**	**L**	**L**	**L**
71	Chunya				1	1	3			3	
72	Mbarali				1	1	3			1	
73	Mbeya (V)				1	1	2				
74	Kyela				1		3			1	
75	Rungwe				1	2	3			2	
76	Ileje				1		1			2	
77	Mbozi				1	1	3			2	
78	Mbeya (M)				1	1	2				
	RVS			**1**	4	4	3				
	MBEYA - TOTAL			**1**	**12**	**11**	**23**			**11**	
79	Iramba E				1	1	1			1	
80	Iramba W				1	1	1			1	
81	Singida (V)				1	1	2		2		2
82	Manyoni				1	1	2		1	1	
83	Singida (M)				1	2	2			2	
	RVS		**1**		3	3	4			1	
	SINGIDA - TOTAL		**1**		**8**	**9**	**12**		**3**	**6**	**2**
84	Nzega				2	2	3				
85	Igunga					1	2		2		
86	Uyui				1	1	2		3		
87	Sikonge					1				2	3
88	Urambo					1	2		1		
89	Tabora (M)					1	1		2		
	RVS			**1**	2	2	2				1
	TABORA - TOTAL			**1**	**5**	**9**	**12**		**8**	**2**	**4**
90	Mpanda TC									1	
91	Mpanda DC				1	2	2			1	
92	Sumbawanga (V)				1	2					
93	Nkansi									2	
94	Sumbawanga (M)				1	1	2				
	RVS		**1**		6	2	4				
	RUKWA - TOTAL		**1**		**9**	**7**	**8**			**4**	
95	Kibondo						2	1			1
96	Kasulu					1	2			5	
97	Kigoma (V)				2	1	3			4	
98	Kigoma /Ujiji				1	1	1		1	1	
	RVS		**1**		6	9	2	1			
	KIGOMA - TOTAL		**1**		**9**	**12**	**10**	**2**	**1**	**10**	**1**
99	Bariadi				1	1	3		2	3	
100	Maswa					2	2			1	
101	Shinyanga (V)				1	1	1				
102	Kishapu				1	1	2				
103	Kahama						2				
104	Bukombe					1	1				
105	Meatu				1	1	2				
106	Shinyanga (M)					1	1				
	RVS			**1**	4	2	3				
	SHINYANGA - TOTAL			**1**	**8**	**10**	**17**		**2**	**4**	

Sn	District / RVS	New WICRs			ILRs and Refrigerators at RVSs ad DVSs						
					TCW 1152	TCW 3000	MF 304	SB 300	SIBIR V240 EK	SIBIR 170 EG	MK 304/ MK 302
	Capacity	**4.5**	**9**	**12**	**169**	**127**	**264**		**108**	**55**	**108**
	Unit	**M3**	**M3**	**M3**	**L**	**L**	**L**	**L**	**L**	**L**	**L**
107	Karagwe				2	2	2				
108	Chato									2	
109	Bukoba (V)				2		3				
110	Missenyi					1	2				
111	Muleba				1	1	3			2	1
112	Biharamulo						1			2	
113	Ngara				4	1					
114	Bukoba (M)					1				1	
	RVS			**1**	2	3	7			4	
	KAGERA - TOTAL			**1**	**11**	**9**	**18**			**11**	**1**
115	Ukerewe				2	1	3				1
116	Magu				2	1	3				
117	Kwimba				2		3				
118	Misungwi				1	1	3				
119	Sengerema				1	1	3			1	
120	Geita				1	1	1			2	
121	Ilemela										
122	Nyamagana				2	2	3				1
	RVS			**1**	4	1	3				
	MWANZA - TOTAL			**1**	**15**	**8**	**22**			**3**	**2**
123	Tarime				2	2	1		1		
124	Serengeti				1		1		2	3	
125	Musoma (V)						1			2	
126	Bunda				1	1	1				
127	Musoma (M)					3					
128	Rorya				2	1	1		1		
	RVS		**1**		2	6					
	MARA - TOTAL		**1**		**8**	**13**	**5**		**4**	**5**	
129	Simanjiro				1		2			2	
130	Kiteto				1		2			2	
131	Babati DC				3		3			2	
132	Babati TC					1					
133	Hanang				1	2				2	
134	Mbulu				1		1		1	2	
	RVS		**1**		3	2	3			2	
	MANYARA - TOTAL		**1**		**10**	**5**	**11**		**1**	**12**	
	MSD - EPI new			**8**							
	MSD - EPI old	**3**									
	reserve for new regions *		**3**								
Total MSD – CVS		**3**	**3**	**8**							
Total -TANZANIA MAINLAND		**3**	**19**	**15**	**178**	**197**	**282**	**4**	**42**	**131**	**24**

* 4 New regions are formed and 1 more WICR is required.

E - Table of expansion plan of vaccine storage at district level.

Sn	District	Live Births	Surviving Infants	Positive storage	Positive storage	TCW 3000 per district	TCW 3000 Available	TCW 3000 Required
1	Kondoa	19,416	17,449	544.6	680.8	6	0	6
2	Mpwapwa	13,296	11,949	372.9	466.1	4	1	3
3	Kongwa	13,376	12,021	375.2	469.0	4	0	4
4	Chamwino	21,852	19,638	612.9	766.1	7	1	6
	Bahi						1	0
5	Dodoma (M)	17,364	15,605	487.1	608.9	5	1	4
	DODOMA	**85,303**	**76,662**					
6	Monduli	9,737	9,095	282.7	353.4	3	0	3
7	Meru	24,571	22,952	713.4	891.8	7	0	7
8	Arusha DC	10,595	9,897	307.6	384.5	3	2	1
	Arusha Mun						3	0
	Longido						2	0
9	Karatu	8,492	7,932	246.6	308.3	3	2	1
10	Ngorongoro	6,163	5,757	178.9	223.6	2	1	1
	ARUSHA	**59,558**	**55,633**					
11	Rombo	8,245	8,105	250.6	313.3	3	1	2
12	Mwanga	3,797	3,732	115.4	144.3	2	1	1
13	Same	7,951	7,816	241.7	302.1	3	1	2
14	Moshi (V)	11,252	11,061	342.0	427.5	4	0	4
15	Hai	8,245	8,105	250.6	313.3	3	1	2
16	Moshi (M)	4,627	4,548	140.6	175.8	2	0	2
	Siha						0	0
	KILIMANJARO	**44,117**	**43,367**					
17	Lushoto	18,636	17,326	538.8	673.5	6	0	6
18	Korogwe DC	10,546	9,805	304.9	381.1	3	1	2
19	Korogwe TC						2	0
20	Mkinga						2	0
21	Muheza	9,978	9,277	288.5	360.6	3	0	3
22	Tanga	7,834	7,283	226.5	283.1	3	0	3
23	Pangani	1,454	1,352	42.0	52.5	1	0	1
	Handeni	11,653	10,834	336.9	421.1	4	1	3
	Kilindi	7,079	6,581	204.7	255.9	2	2	0

Sn	District	Live Births	Surviving Infants	Positive storage	Positive storage	TCW 3000 per district	TCW 3000 Available	TCW 3000 Required
	TANGA	**67,181**	**62,458**					
25								
26	Kilosa	22,895	20,986	653.6	817.0	7	0	7
27	Morogoro (V)	11,339	10,393	323.7	404.6	4	0	4
28	Mvomero	11,743	10,764	335.3	419.1	4	0	4
29	Kilombero	13,377	12,261	381.9	477.4	4	3	1
	Ulanga	8,332	7,637	237.9	297.4	3	0	3
	Morogoro (M)	9,431	8,644	269.2	336.5	3	0	3
	MOROGORO	**77,117**	**70,685**					
30								
31	Bagamoyo	10,731	9,827	306.1	382.6	3	1	2
32	Kibaha TC	5,498	5,035	156.8	196.0	2	2	0
33	Kibaha DC						1	0
34	Kisarawe	4,111	3,765	117.3	146.6	2	0	2
35	Mkuranga	8,856	8,110	252.6	315.8	3	1	2
	Rufiji	10,629	9,734	303.2	379.0	3	1	2
	Mafia	1,618	1,482	46.2	57.8	1	0	1
	PWANI	**41,442**	**37,953**					
36								
37	Kinondoni	43,167	40,698	1263.8	1579.8	13	4	
38	Ilala	24,943	23,516	730.3	912.9	8	4	
	Temeke	33,236	31,335	973.1	1216.4	10	1	
	DAR ES SALAAM	**101,346**	**95,549**					
39								
40	Kilwa	6,547	6,079	189.1	236.4	2	1	1
41	Lindi (V)	7,641	7,095	220.7	275.9	3	2	1
42	Ruangwa	4,840	4,494	139.8	174.8	2	2	0
43	Nachingwea	5,786	5,372	167.1	208.9	2	1	1
44	Liwale	3,390	3,148	97.9	122.4	1	1	0
	Lindi (M)	1,821	1,691	52.6	65.8	1	1	0
	LINDI	**30,026**	**27,879**					
45								
46	Mtwara (V)	9,303	8,315	259.7	324.6	3	1	2
47	Newala	7,888	7,050	220.2	275.3	3	1	2
48	Tandahimba	9,542	8,529	266.4	333.0	3	2	1
49	Masasi	20,016	17,890	558.7	698.4	6	0	6
	Mtwara (M)	4,153	3,712	115.9	144.9	2	0	2

Sn	District	Live Births	Surviving Infants	Positive storage	Positive storage	TCW 3000 per district	TCW 3000 Available	TCW 3000 Required
	Nanyumbu						1	0
	MTWARA	**50,902**	**45,496**					
50								
51	Tunduru	12,596	11,569	360.2	450.3	4	1	3
52	Songea (V)	8,529	7,834	243.9	304.9	3	1	2
53	Namtumbo	8,108	7,447	231.9	289.9	3	3	0
54	Mbinga	20,535	18,861	587.3	734.1	6	1	5
	Songea (M)	6,900	6,338	197.4	246.8	2	1	1
	RUVUMA	**56,667**	**52,049**					
55								
56	Iringa (V)	9,084	8,181	255.3	319.1	3	1	2
57	Kilolo	7,840	7,061	220.3	275.4	3	1	2
58	Mufindi	10,631	9,574	298.8	373.5	3	1	2
59	Makete	3,638	3,276	102.2	127.8	1	1	0
60	Njombe TC	15,808	14,237	444.3	555.4	5	1	4
61	Njombe DC						0	0
	Ludewa	4,868	4,384	136.8	171.0	2	1	1
	Iringa (M)	4,143	3,731	116.4	145.5	2	1	1
62	**IRINGA**	**56,012**	**50,444**					
63								
64	Chunya	13,694	12,377	386.1	482.6	4	1	3
65	Mbarali	14,780	13,358	416.7	520.9	5	1	4
66	Mbeya (V)	15,897	14,368	448.2	560.3	5	1	4
67	Kyela	10,349	9,353	291.7	364.6	3	0	3
68	Rungwe	17,099	15,454	482.0	602.5	5	2	3
69	Ileje	6,836	6,178	192.7	240.9	2	0	2
	Mbozi	36,096	32,624	1017.6	1272.0	11	1	10
	Mbeya (M)	14,543	13,144	410.0	512.5	5	1	4
70	**MBEYA**	**129,294**	**116,856**					
71								
72	Iramba	17,334	16,311	506.6	633.3	5	2	3
73	Singida (V)	18,109	17,041	529.3	661.6	6	1	5
	Manyoni	10,164	9,564	297.1	371.4	3	1	2
	Singida (M)	5,211	4,904	152.3	190.4	2	2	0
74	**SINGIDA**	**50,818**	**47,820**					
75								
76	Nzega	28,495	26,651	828.3	1035.4	9	2	7

Sn	District	Live Births	Surviving Infants	Positive storage	Positive storage	TCW 3000 per district	TCW 3000 Available	TCW 3000 Required
77	Igunga	23,187	21,687	674.0	842.5	7	1	6
78	Uyui	20,349	19,032	591.5	739.4	6	1	5
79	Sikonge	10,375	9,704	301.6	377.0	3	1	2
	Urambo	27,130	25,375	788.6	985.8	9	1	8
	Tabora (M)	17,020	15,919	494.8	618.5	5	1	4
80	**TABORA**	**126,556**	**118,368**					
81								
82	Mpanda TC						0	0
83	Mpanda DC	28,323	25,479	795.1	993.9	8	2	6
	Sumbawanga (V)	27,453	24,697	770.7	963.4	8	2	6
	Nkansi	16,053	14,441	450.7	563.4	5	0	5
	Sumbawanga (M)	10,661	9,591	299.3	374.1	3	1	2
84	**RUKWA**	**82,490**	**74,208**					
86								
87	Kibondo	26,009	24,129	750.6	938.3	8	0	8
	Kasulu	35,109	32,571	1013.2	1266.5	10	1	9
	Kigoma (V)	27,719	25,715	799.9	999.9	8	1	7
	Kigoma /Ujiji	14,429	13,386	416.4	520.5	5	1	4
89	**KIGOMA**	**103,267**	**95,801**					
90								
91	Bariadi	49,062	45,387	1412.2	1765.3	14	1	13
92	Maswa	23,750	21,971	683.6	854.5	7	2	5
93	Shinyanga (V)	20,028	18,528	576.5	720.6	6	1	5
94	Kishapu	16,657	15,409	419.5	524.4	5	1	4
95	Kahama	42,633	39,440	1227.2	1534.0	13	0	13
	Bukombe	34,338	31,766	988.4	1235.5	10	1	9
	Meatu	18,677	17,278	537.6	672.0	6	1	5
	Shinyanga (M)	8,581	7,938	247.0	308.8	3	1	2
97	**SHINYANGA**	**213,725**	**197,717**					
98								
99	Karagwe	31,562	28,617	892.3	1115.4	9	2	7
100	Chato						0	0
101	Bukoba (V)	23,807	21,586	673.1	841.4	7	0	7
	Missenyi						1	0
	Muleba	24,903	22,580	704.1	880.1	7	1	6

Sn	District	Live Births	Surviving Infants	Positive storage	Positive storage	TCW 3000 per district	TCW 3000 Available	TCW 3000 Required
	Biharamulo	31,482	28,545	890.1	1112.6	9	0	9
102	Ngara	25,326	22,963	716.0	895.0	8	1	7
103	Bukoba (M)	6,344	5,752	179.4	224.3	2	1	1
105	**KAGERA**	**143,425**	**130,043**					
106								
107	Ukerewe	13,563	12,562	390.8	488.5	4	1	3
108	Magu	20,987	19,438	604.7	755.9	6	1	5
109	Kwimba	15,582	14,432	449.0	561.3	5	0	5
	Misungwi	12,401	11,486	357.3	446.6	4	1	3
	Sengerema	26,053	24,130	750.7	938.4	8	1	7
	Geita	37,594	34,820	1083.3	1354.1	11	1	10
110	Ilemela	12,311	11,402	354.7	443.4	4	0	4
111	Nyamagana	9,065	8,396	261.2	326.5	3	2	1
112	**MWANZA**	**147,556**	**136,666**					
113								
114	Tarime	36,364	33,069	1030.8	1288.5	11	2	9
	Serengeti	13,976	12,710	396.2	495.3	4	0	4
	Musoma (V)	21,700	19,734	615.1	768.9	7	0	7
	Bunda	19,339	17,587	548.2	685.3	6	1	5
115	Musoma (M)	8,756	7,963	248.2	310.3	3	3	0
116	Rorya						1	0
117	**MARA**	**100,135**	**91,063**					
118								
119	Simanjiro	9,081	8,683	269.3	336.6	3	0	3
	Kiteto	9,232	8,828	273.7	342.1	3	0	3
	Babati DC	18,731	17,911	555.4	694.3	6	0	6
	Babati TC						1	0
	Hanang	13,576	12,981	402.5	503.1	4	2	2
	Mbulu	16,373	15,656	485.5	606.9	5	0	5
120	**MANYARA**	**66,993**	**64,059**					

16. Revision history

Date	Change summary	Reason for change	Approved