Report on VMAT of Assam
Phase II - 2011

Findings and recommendations of the assessment team

Preface

The vaccine management assessment focuses on three key aspects of

a) Knowledge,
b) Practices and
c) Infrastructure.

The structure of assessment is based on principle that "*Knowledge without practice is useless; Practice without knowledge is dangerous; Good knowledge with correct practices are ineffective without enabling environment".*

The assessment leads to improvements in these three areas such that the logistics are well managed and ensures quality vaccine, of right quantity, reaches at right place at right time.

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Executive summary

The vaccine management and cold chain of immunization program in Assam was assessed using Vaccine Management Assessment Tool (VMAT) in year 2010. The assessment was carried out in 11 districts of the state, which leads to 18 recommendations. Some of these recommendations at state level and district level were implemented successfully by April 2011. Following the successful outcome of first round of assessment, state of Assam decided to conduct the VMAT for remaining districts in April 2011. The key objectives of conducting the second round of VMAT in the state were to:

a. Identify the challenges in cold chain, vaccine management and practices in remaining districts of the state;
b. To train the key staff (DIOs and other stake holders who are responsible for implementation and operation of immunization program in the districts) of remaining districts in vaccine management practices.
c. Identify major knowledge gaps
d. Identify major performance gaps
e. Identify resource and training needs

The training using VMAT was held in Guwahati where a total of 50 personnel were trained over a period of five days. The assessment of selected sites was carried out over a period of two weeks followed by a workshop on consolidation of data and formulation of recommendations.

The state vaccine store was not assessed in 2011 phase of VMAT. This is because the assessment should be repeated only after minimum period of two years.

The consolidated result of 2011 assessment clearly reflects similar trend of scoring as of 2010 districts, even certain criteria scored lowered than that of selected 2010 districts. This suggests that the implementation of recommendations of phase-I was carried out in only those districts and learnings were not extended to other districts.

The assessment follows the principle that all the staff responsible for handling vaccine should have adequate knowledge for safe handling of vaccine, the procedures are correctly followed and there are sufficient means providing the adequate environment to manage the logistics effectively.

The key findings from assessment are as following:

Areas that worked well

1. Cold chain capacity of all the districts stores and PHCs was adequate to accommodate routine vaccine including second dose of Measles vaccine.

2. Most of the district stores are equipped with generators for power supply backup (*Though the capacity of generators need to be improved at most places to provide backup to all the cold chain units*).
3. Vehicle for vaccine transportation was available at all the district stores except at Golaghat and Goalpara.
4. Majority of the sites assessed had all the ILRs/DFs in operational status.
5. The breakdown of cold chain equipment was attended promptly.
6. Majority of equipment was protected with voltage stabilizers.
7. The VVM on vaccine was correctly interpreted and used for stock management at most sites.

Areas that needed improvement

a) ***Related to Infrastructure*** *(Ideal requirements are: Sufficient Infrastructure is available providing enabling environment for safety of vaccine. Quality cold chain equipment available with required capacity, building space available with adequate standards and quality transportation facilities are available*.)

1. The cold rooms installed in selected districts do not have functional 24x7 chart recorders and alarm systems. This leads to inadequate temperature monitoring of cold rooms, leaving the vaccines at high risk.
2. There is inadequate space for dry storage and cold stores at almost all the stores. This leads to improper storage of dry supply and installations of cold chain equipment that, at few districts did not meet the required standards.
3. Most of the districts do not have adequate *means* of providing the comprehensive power supply backup. While the fuel was not stocked up sufficiently, some of stores generators do not have adequate capacity to run all the equipment at the same time. This leads to poor quality assurance by potential break down in cold chain.
4. The vehicle for transportation is not available at two of the district stores. This leads to erratic vaccine supply and subject to availability of alternative means of transporting vaccine in those districts; the quantity and frequency of distribution of vaccine may not match the requirements.
5. Few of the stores are not clean and pest free. This leads to potential threat of stock being damaged/infected by pests.

b) Related to knowledge of staff (Ideal requirements are: Knowledge of cold chain handler through formal or on-job training, through supportive supervision. All the staff responsible for handling should have good knowledge of vaccine management aspects.)

1. The basic and most necessary knowledge (of safety of vaccine from exposure to temperatures), required for cold chain handlers and storekeepers, was found to be inadequate at 6 of 11 districts. There is a potential risk of freeze-sensitive vaccine being exposed to freezing and it is not being noticed or could not be avoided.
2. The cold chain handlers/storekeepers at half of the districts assessed did not possess the knowledge and ability to adjust the vaccine distribution frequency. This could lead to stock out of vaccine at

corresponding PHCs in case of reduced capacity at district store (for example in the event of prolonged failure of one of the ILR which is awaiting replacement).

3. The cold chain handlers at more than half of district stores had poor knowledge of ice-pack conditioning. This is a direct threat to freeze sensitive vaccine, especially HepB, to be damaged during transportation.
4. The concept of bundling freeze-dried vaccine with corresponding diluent was not completely followed. There could be lack of understanding of the bundling concept, which is matching the vaccine and diluent by batch numbers.
5. The knowledge on basic principles of vaccine wastage, towards monitoring and controlling wastage and including correct wastage rates for computation is missing at almost all the district stores.

c) Related to practices followed (Ideal requirements: Following the right practices based on standard operating procedures. Given that the enabling environment is provided, the practices are followed and records are well maintained).

1. The temperature records of WIC/ILR/DF were not available at most of the districts though thermometers were available. This is at high risk of not maintaining cold chain.
2. The contingency plan in the event of equipment/prolonged power failure was missing from most sites. This in combination with poor backup power supply management is at high risk of maintaining cold chain.
3. Preventive maintenance of cold chain equipment and transport was very poor in all the districts. This could lead to more frequent breakdowns of equipment.
4. The stock books were not updated, the physical stock of vaccine did not match the book stock and stock movements of diluents were not recorded. This in combination with stock levels not defined at majority of districts, could lead to poor stock management, not following EEFO principle and could lead to expiry of vaccine in stock.
5. Vaccine distribution plans were not prepared for nine of eleven districts. This leads to issuing of vaccine in unscheduled manner and the realistic estimation of requirement could not obtained in advance.

1. Assessment result of district stores

The assessment result shows gaps in critical area of vaccine management at district and PHC level. The key shortcomings in accordance with VMAT criteria at district level are listed in following section.

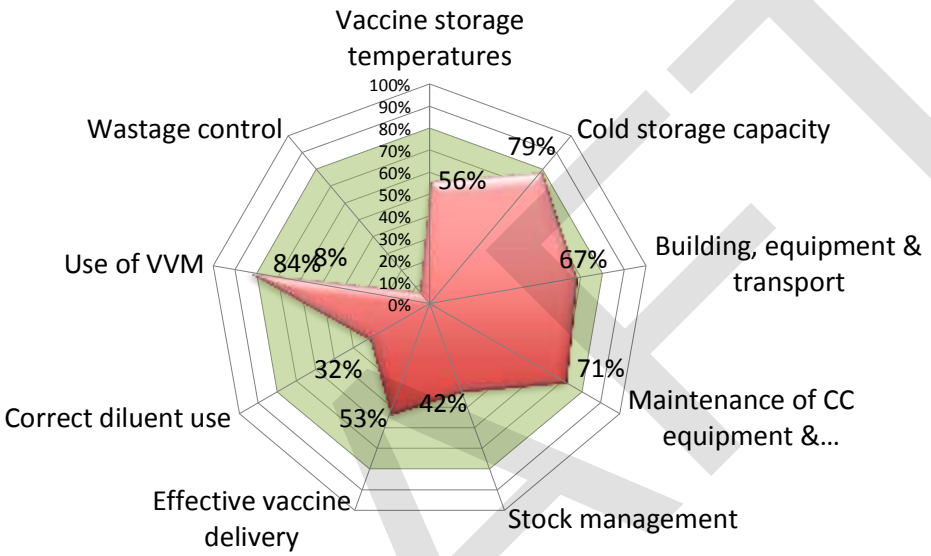


Figure 1: Assessment result of district stores

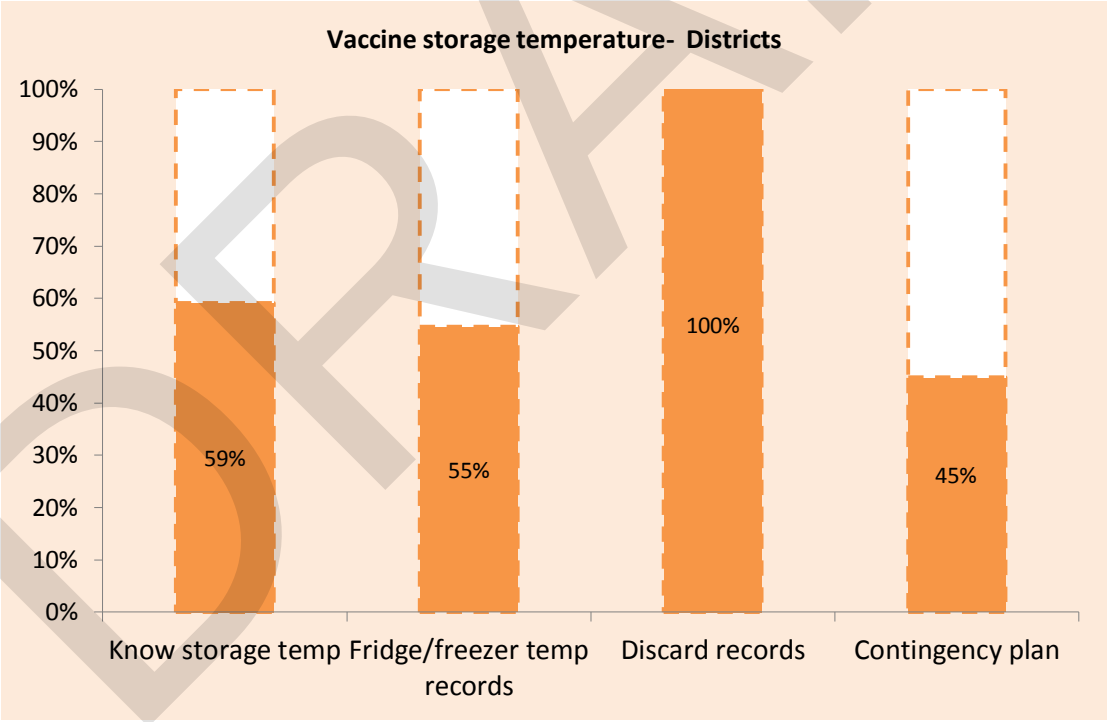
1.1. Temperature maintenance

1. The basic and most necessary knowledge required for cold chain handlers and storekeepers with regard to safety of vaccine from exposure to temperatures was found to be inadequate for 6 of 11 districts. This represents that either cold chain handlers were not trained through cold chain handlers training course or the training was ineffective.
2. The temperature records of cold chain equipment were available at only 3 of 11 districts. This is critical, as the temperature monitoring is not happening at 8 of 11 districts.
3. The contingency plan, in the event of failure of temperature maintenance, was available to satisfaction only at 2 of 11 districts.

Though few of the elements of temperature maintenance are followed at districts, by and large the temperature maintenance is at high risk because of missing critical links.

Table 1: decision table on temperature maintenance of district stores

Temperature maintenance	Kamrup (R)	Nalbari	Bongaigaon	Kokrajhar	Tinsukia	Sivsagar	Jorhat	Golaghat	Goalpara	Sonitpur	Lakhimpur
Knowledge of safe temperature range for vaccine	Yes	No	Yes	No	Yes	No	No	No	Yes	No	No
Proof of temperature monitoring	No	Yes	No	No	Yes	No	Yes	No	No	No	No
Contingency plan	Yes	No	No	No	No	No	No	No	Yes	No	No
Decision: *Is safety of vaccine assured? (Safety of vaccine assured only if above three conditions are met)*	Risk	Risk	Risk	Risk	Risk	Risk	Risk	Risk	Risk	Risk	Risk
	Though few of the elements of temperature maintenance are followed, by and large the temperature maintenance is at high risk because of missing critical links.										



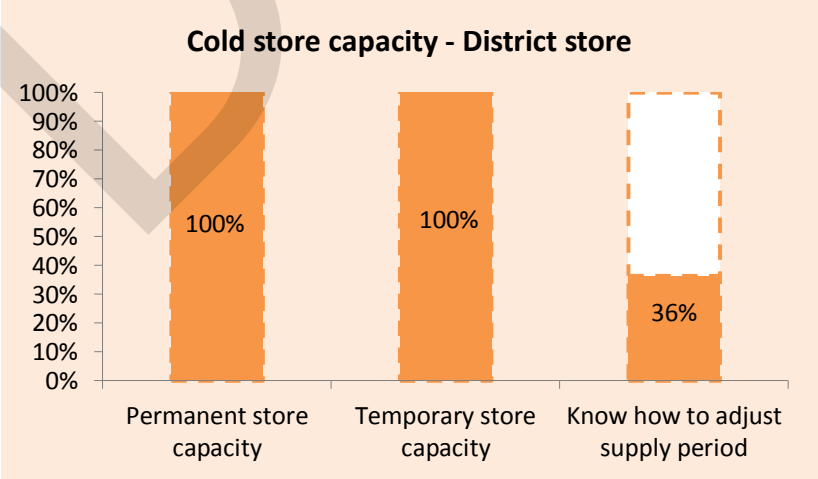
1.2. Cold storage capacity

1. The vaccine storage capacity in form of WIC/ILR/DF has been sufficient at all the levels of district stores.
2. The knowledge and ability to adjust the vaccine distribution frequency is critical when there is shortage of storage volume; Only 6 of 11 district storekeepers/cold chain handlers could demonstrate how to effectively adjust the distribution frequency.

With the given immunization schedule, the district stores are well equipped to store the vaccines adequately. This is including second dose of measles vaccine and JE for selected districts for routine immunization.

Table 2: Decision table on cold storage capacity of district stores

Cold storage capacity	Kamrup (R)	Nalbari	Bongaigaon	Kokrajhar	Tinsukia	Sivsagar	Jorhat	Golaghat	Goalpara	Sonitpur	Lakhimpur
Sufficient permanent capacity for storage of vaccine at +4 Deg C and -20 Deg C	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sufficient temporary capacity for handling campaign vaccine at +4 Deg C and -20 Deg C	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Knowledge of staff on how to adjust supply frequency with storage capacity	No	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes	No
Decision: *Can store manage the volume of vaccine required for this store?*	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	The district vaccine stores do not have storage capacity constrains for current vaccine in immunization schedule and campaign vaccines. However, the staff need training in computing vaccine volumes and adjusting frequencies when needed.										



1.3. Building, equipment and transport

Adequacy of building space, quality of cold chain equipment and availability of transport provides enabling environment for effective vaccine management.

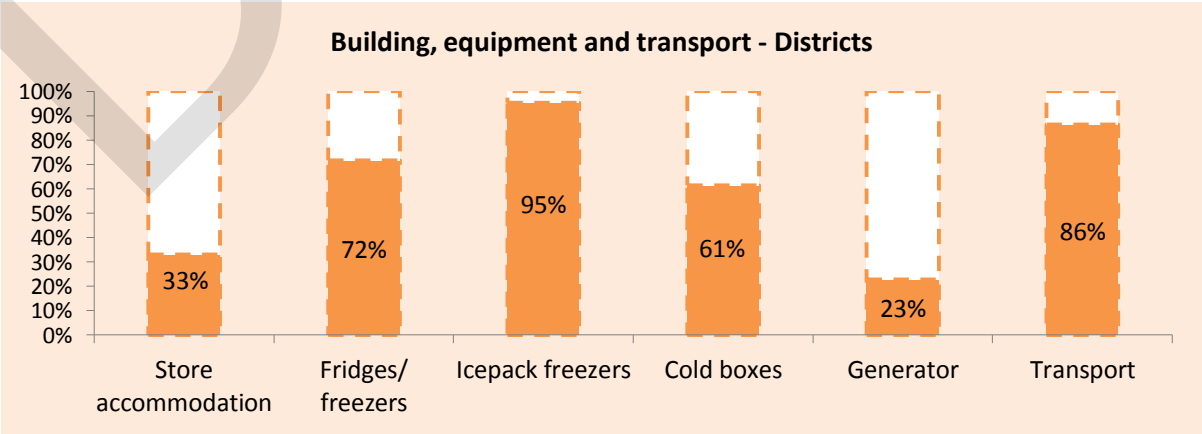
1. There is inadequate space for dry storage at almost all the stores except Nalbari. The storerooms for cold chain and dry storage are small and can barely accommodate the cold chain equipment.
2. All the ILRs and DFs are procured by central government and distributed to states hence all the units are of approved specifications. However the important components like 7-day chart recorders and alarms are not functional at any of the cold rooms in Goalpara, Sonitpur and Lakhimpur.
3. The WIC of Goalpara was not fully functional at the time of inspection. There is also shortage of ice pack making capacity (freezers) at same district. Goalpara also has shortage of cold boxes.
4. The knowledge and practice of ice pack conditioning was seen at five of eleven districts.
5. Though the generators are available and functional at eight districts, none of the 11 districts assessed has adequate means to assure power back for prolonged absence of electricity. The fuel stock was either missing or too less and staff also reported shortage of funds to operate the generators for required durations. The generator size was also not sufficient to operate all the units at the same time.
6. Vehicle for transportation of vaccine was not available/not functional at Golaghat and Goalpara districts.

Among all the districts assessed, Goalpara store had most shortcomings in terms of building adequacy, equipment functionality and transport services. Voltage stabilizers are missing at two districts. With lack of space, ice pack conditioning would be difficult to practice and orderly and safe storage in dry area is challenge. Availability and operation of back up power supply is an issue. Staff might need training in conditioning of ice packs. While generators are mostly available, they are not operational due to lack of fuel or of incorrect size.

Table 3: Decision table on adequacy and standards of building, equipment and transport at district level

Building, equipment and transport	Kamrup (R)	Nalbari	Bongaigaon	Kokrajhar	Tinsukia	Sivsagar	Jorhat	Golaghat	Goalpara	Sonitpur	Lakhimpur
Building for cold store is of appropriate size and meets standards (including dry storage)	No	Yes	No	No	No	No	No	No	Partial	No	Partial

Building, equipment and transport	Kamrup (R)	Nalbari	Bongaigaon	Kokrajhar	Tinsukia	Sivsagar	Jorhat	Golaghat	Goalpara	Sonitpur	Lakhimpur
Standard specifications are met for the cold chain equipment (Cold rooms, ILR and DFs)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
All cold chain equipment are Operational and maintaining the required temperature	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes
Every refrigeration and freezing unit protected through voltage stabilizer	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Capacity of making ice-packs for meeting routine demand is sufficient	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Cold boxes and vaccine carrier are available	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
Staff know how to condition the ice packs for transportation	Yes	Yes	Yes	No	Yes	No	Yes	No	No	No	No
Diesel generator available and in working order	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Backup power supply sufficient and operational	No	No	No	No	No	No	No	No	No	No	No
Transport services are operational	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
	No	Partially	No	No	No	No	No	No	No	No	No
Decision: *is infrastructure Sufficient? Is it providing enabling environment to perform?*	Voltage stabilizers are missing at two districts. With lack of space, ice pack conditioning would be difficult to practice and orderly and safe storage in dry area is challenge. Availability and operation of back up power supply is an issue. Staff might need training in conditioning of ice packs. While generators are mostly available, they are not operational due to lack of fuel or of incorrect size.										



1.4. Maintenance of cold chain equipment and transport

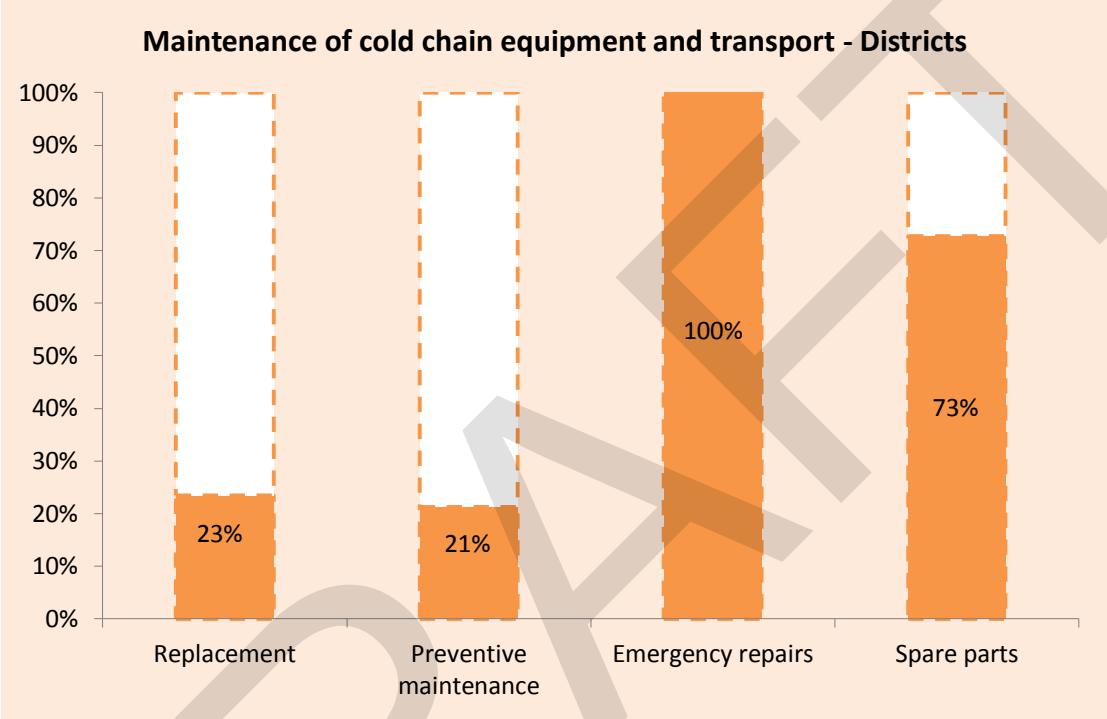
1. Some of the district stores (Kamrup, Nalbari and Kokrajhar) did received the replacement of old/non repairable cold chain equipment; other districts had no inventory of cold chain equipment.
2. Preventive maintenance was very poor in all the districts. There was no plan/schedule of each equipment's preventive maintenance, the vital signs of maintenance done in past was also negligible. The breakdowns were attended promptly, except for Kokrajhar and Goalpara where the equipment was not repaired due to lack of spare parts. However the non-functional equipment had no impact on vaccine storage capacity as the operational capacity was sufficient.
3. Preventive maintenance of transport was not done regularly and most of the districts did not have service records.

Planning replacement is essential part of maintenance. Though cold chain equipment is procured by central government and replacement is provided on bulk basis to entire state, the micro plan of equipment replacement is missing. There is a risk of equipment not been replaced after failure beyond repair. Similarly, there are no plans for replacement of vehicles.

Table 4: Decision table on maintenance of cold chain equipment and transport at district level

Maintenance of equipment and transport	Kamrup (R)	Nalbari	Bongaigaon	Kokrajhar	Tinsukia	Sivsagar	Jorhat	Golaghat	Goalpara	Sonitpur	Lakhimpur
Planned replacement of cold chain equipment and transport is carried out	Partial	Partial	No	Partial	No	No	No	No	No	No	No
Planned preventive maintenance of cold chain equipment and transport is carried out	Partial	No	No	Partial	No	No	No	No	No	Partial	No
Emergency repairs of equipment is carried out in timely manner	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adequate supplies of spares and consumables are available for equipment and transport maintenance	Yes	No	Yes	Yes	Partial	Yes	Yes	Partial	Partial	Partial	Partial
Decision: *Is infrastructure well maintained?*	Risk	No	Risk	Risk	No	No	No	No	No	No	No
	Planning replacement is essential part of maintenance. Though cold chain equipment is procured by central government and replacement is provided on bulk basis to entire state, the micro										

Maintenance of equipment and transport	Kamrup (R)	Nalbari	Bongaigaon	Kokrajhar	Tinsukia	Sivsagar	Jorhat	Golaghat	Goalpara	Sonitpur	Lakhimpur
	plan of equipment replacement is missing. There is a risk of equipment not been replaced after failure beyond repair. Similarly, there are no plans for replacement of vehicles.										



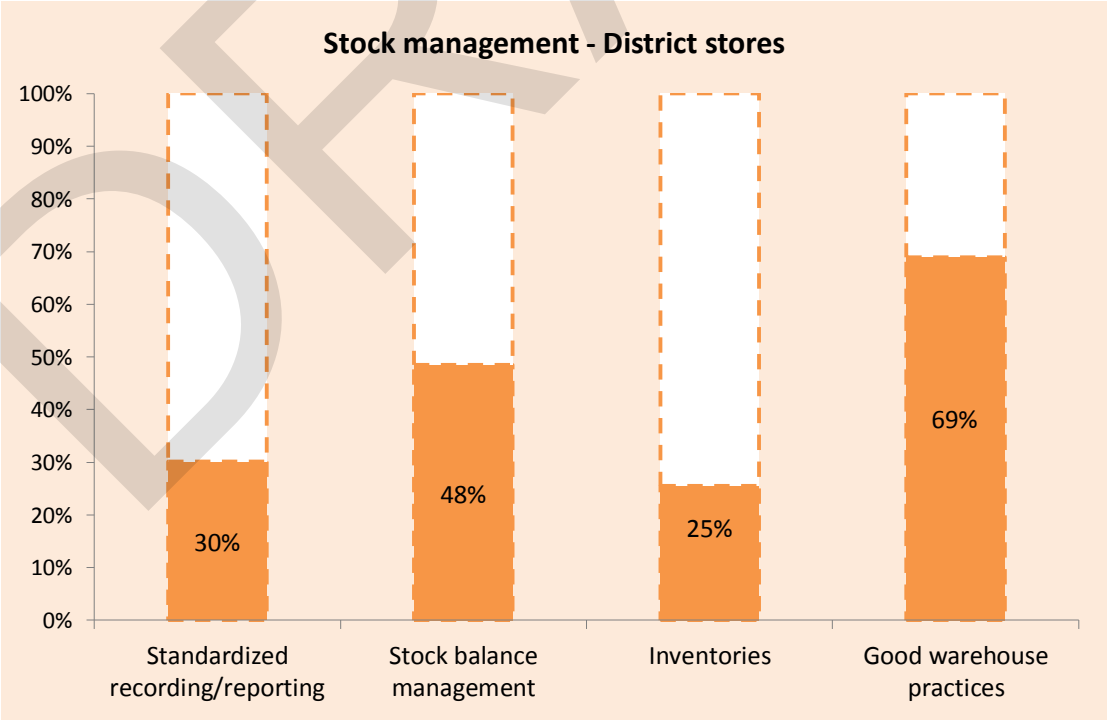
1.5. Stock management

1. The stock books do not capture the stock movements of diluents along with vaccine. The stock book format is also not standardized to the recommended guidelines of Immunization division, Ministry of Health & Family Welfare.
2. Stock levels such as safety stock, order/indent level and maximum stock levels are defined. Periodic reconciliation of stock is not done at most of the districts.
3. Few of the stores are not clean and pest free. Though vaccines are kept in locked ILRs at most districts and records are secured, the cold chain equipment are not marked with content list. For a store of district level where there are many ILRs and DFs, the content list is essential for each unit.

Most of the districts stock management practices do not assure safety of vaccine including assuring stock maintenance, prevention from contamination, damage and theft and traceability of vaccine and diluents movements.

Table 5: Decision table on stock management at district level

Stock management	Kamrup (R)	Nalbari	Bongaigaon	Kokrajhar	Tinsukia	Sivsagar	Jorhat	Golaghat	Goalpara	Sonitpur	Lakhimpur
Standardized recording and reporting of all transactions is carried out	Partial	Partial	No	No	Partial	No	Partial	No	No	Partial	No
Stock levels were defined	No	No	Yes	Partial	No	No	Partial	No	No	Partial	No
Periodic physical inventories are carried out and physical stock tallies with book records	No	No	No	No	No	No	No	No	No	No	Partial
Good warehousing practices are in place (clean and pest free?)	No	No	No	Partial	Yes	Yes	No	Yes	Partial	Yes	Yes
Decision: *To what degree the safety of vaccine assured through good stock management practices?* (High – Assured, Medium- Few corrections needed, Low – Not assured)	Low	Low	Low	Low	Low	Low	Medium	Low	Low	Medium	Medium
	Diluent records are not maintained. Stock levels (minimum and maximum) are not defined. Vaccine distribution reports are not regularly prepared and circulated. Physical stock of vaccine often not tally with book record. Few stores are not clean and pest free.										



1.6. Effective vaccine delivery

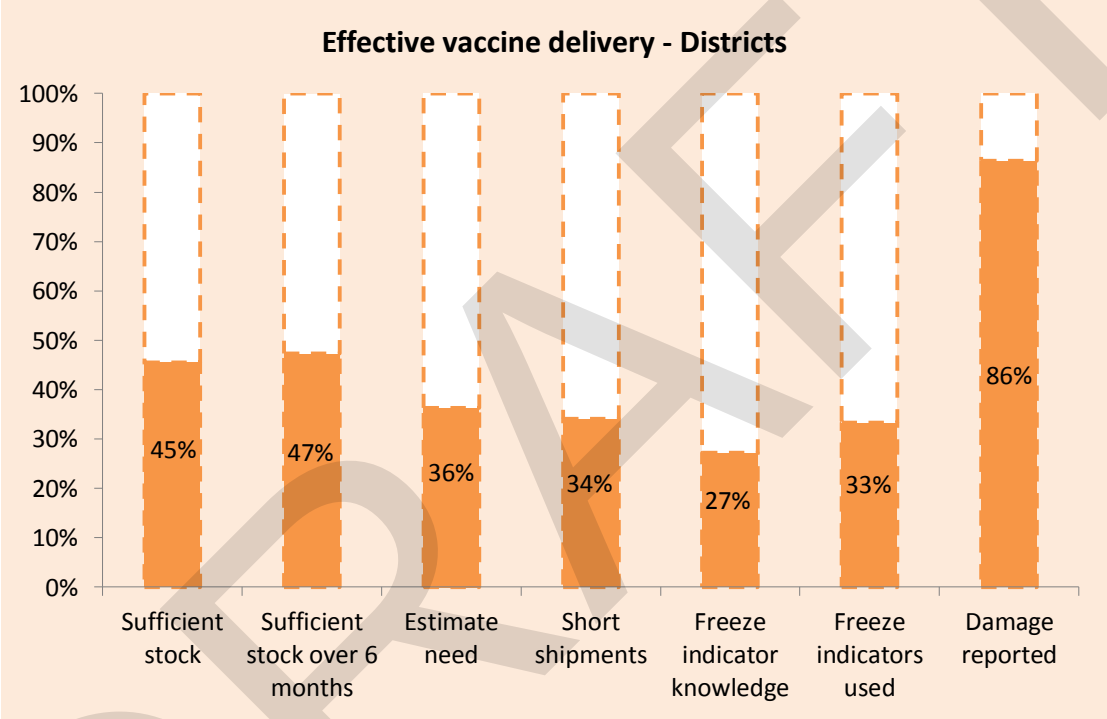
1. Vaccine distribution planning is critical to ensure right quantity of vaccine is delivered to correct plan on time. Only two of the districts had vaccine distribution plan in some form. Among other nine districts, six districts key staff did not had adequate knowledge on estimating vaccine requirement.
2. There have been stock-outs of at least one of the RI vaccine at six district stores. This could have been due to erratic supply of vaccine, however absence of distribution plan could have lead to irrational distribution of vaccine leading to stock outs.
3. There were reportedly no damages to vaccine during transportation by and large but there is no provision of recording damages either hence the tracking of damage evidence is missing.

Vaccine has been issued on walk-in basis. In the instance of low stock or stock out vaccine was not issued (and uncorrected later). The storekeepers did not adapt to systematic method of computing requirements and preparing distribution plans due to lack of knowledge. Though there are few damages acknowledged by staff that happened during transportation but they were not reported and corrected.

Table 6: Decision table on effective vaccine delivery at district level

Effective vaccine delivery	Kamrup (R)	Nalbari	Bongaigaon	Kokrajhar	Tinsukia	Sivsagar	Jorhat	Golaghat	Goalpara	Sonitpur	Lakhimpur
Knowledge on estimation of vaccine requirement	Yes	No	No	No	No	No	Yes	Yes	Yes	No	No
Vaccine distribution plans made and followed	Yes	No	No	No	No	No	No	No	No	No	Yes
Sufficient stock of each vaccine and diluent has been available throughout the past six months.	No	Yes	No	Yes	No	No	No	No	Yes	Yes	Yes
Damage to vaccine during transportation has been reported and has been replaced	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Decision: *Is right quantity of vaccine safely delivered?*	Partial	Partial	No	Partial	No	No	No	No	Partial	Partial	Partial

Effective vaccine delivery	Kamrup (R)	Nalbari	Bongaigaon	Kokrajhar	Tinsukia	Sivsagar	Jorhat	Golaghat	Goalpara	Sonitpur	Lakhimpur
	Vaccine has been issued on walk-in basis. In the instance of low stock or stock out vaccine was not issued (and uncorrected later). The storekeepers did not adapt to systematic method of computing requirements and preparing distribution plans due to lack of knowledge. Though there are few damages acknowledged by staff that happened during transportation but they were not reported and corrected.										



1.7. Diluent management

Six of the eleven districts records, stock positions and procedures show that bundling of diluent with vaccine is not done correctly. It is possible that storekeeper knows and follows the principles of diluent bundling, however, if the supply from receiving store is mixed up, it may not be possible for storekeeper to maintain the stock in same proportion. More than half district stores did not demonstrate practice of bundling diluents with vaccines. All except two stores had mismatched stock of diluent and vaccine

Table 7: Decision table on diluent management for freeze dried vaccine

Diluent management	Kamrup (R)	Nalbari	Bongaigaon	Kokrajhar	Tinsukia	Sivsagar	Jorhat	Golaghat	Goalpara	Sonitpur	Lakhimpur
Vaccine and diluent bundling done correctly for vaccine supplied	No	Yes	No	No	Yes	No	Yes	No	Yes	No	Yes
Diluent stock match corresponding vaccine in stock	Yes	No	No	No	No	No	No	No	No	No	Yes
Decision: *Diluents correctly bundled with the vaccine?*	No	Partial	No	No	Partial	No	Partial	No	Partial	No	Yes
	It is possible that storekeeper knows and follows the principles of diluent bundling, however, if the supply from receiving store is mixed up, it may not be possible for storekeeper to maintain the stock in same proportion. More than half district stores did not demonstrate practice of bundling diluents with vaccines. All except two stores had mismatched stock of diluent and vaccine.										

1.8. Effective use of VVM

Storekeepers and cold chain handlers knows how to read and interpret VVM. All except for 2 districts uses VVM for stock management (issuing stage II vaccine ahead of EEFO).

Table 8: Decision table on effective VVM use at district level

Effective use of VVM	Kamrup (R)	Nalbari	Bongaigaon	Kokrajhar	Tinsukia	Sivsagar	Jorhat	Golaghat	Goalpara	Sonitpur	Lakhimpur
Decision: *VVM policy is correctly implemented*	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
	Storekeepers and cold chain handlers knows how to read and interpret VVM. All except for 2 districts uses VVM for stock management (issuing stage II vaccine ahead of EEFO).										

1.9. Vaccine wastage control

Vaccine wastage has been poorly monitored. The national wastage rates are used for computation of requirement and actual wastage from session site data are not computed and referred to.

Table 9: Decision table on vaccine wastage control at district level

Vaccine wastage control	Kamrup (R)	Nalbari	Bongaigaon	Kokrajhar	Tinsukia	Sivsagar	Jorhat	Golaghat	Goalpara	Sonitpur	Lakhimpur
Staff understand the principles involved in calculating vaccine wastage	No	Partial	No	No	No	Partial	No	No	Partial	No	No
Vaccine wastage is monitored and data is used for computation	No	No	No	No	No	No	No	No	No	No	No
Decision: *Are measures in place to control wastage and if wastage data used for computing requirements?*	No	No	No	No	No	No	No	No	No	No	No
	Vaccine wastage has been poorly monitored. The national wastage rates are used for computation of requirement and actual wastage from session site data are not computed and referred to.										

2. Assessment result of PHC level

The assessment covered two randomly selected PHCs from each district. It was assumed that the sampling would reflect:

a. The quantum or quality of training provided to cold chain handlers in vaccine management by assessing their knowledge and practices in various aspects of vaccine management including temperature maintenance
b. Infrastructural gaps with regards to cold chain capacity, building standards, storage space, transportation facilities
c. Maintenance of building, cold chain equipment and transport
d. Effective distribution of vaccine and supplies

The Assessment result of PHC assessment is shown as figure two below. The key shortcomings in accordance with VMAT criteria at PHC level are listed as following.

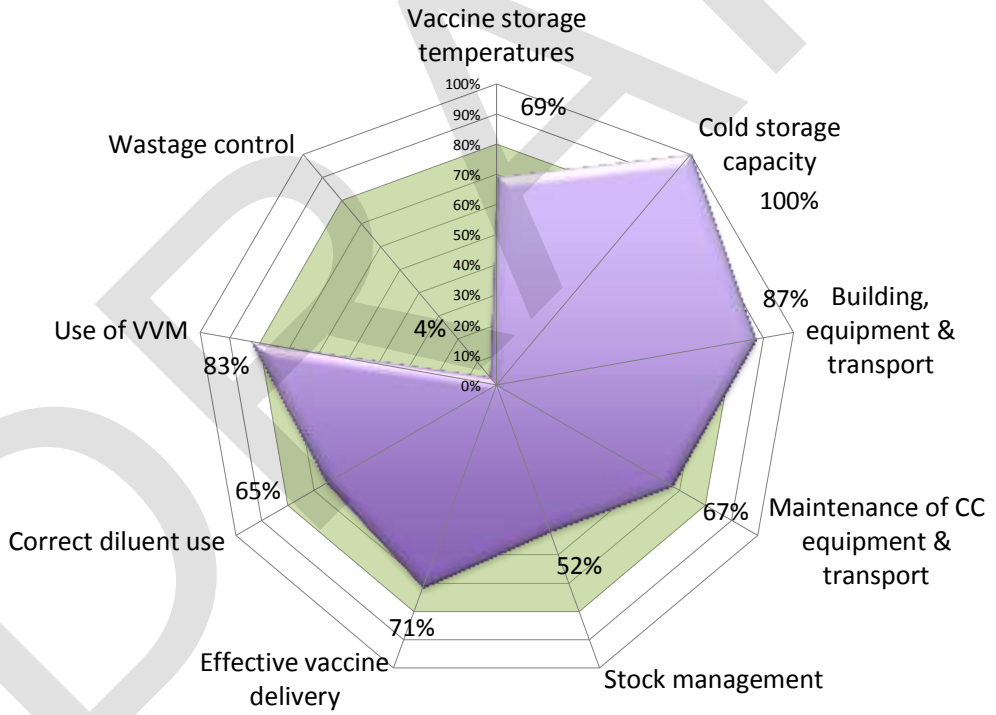


Figure 2: Assessment result of PHC level

The detailed scoring of each PHC against criteria is listed in table 10 below.

Table 10: Detailed scoring of PHCs

S No	Facility ▼ Criterion ►	2 Temperature maintenance	3 Cold chain Capacity	4 Equipment building, Transport	5 Maintenance	6 Stock management	7 Delivery	8 Diluent Management	9 VVMs	11 Wastage control
Bongaigaon										
1	*SijanGram*	10%	100%	70%	60%	33%	55%	25%	78%	0%
2	*Manikpur*	82%	100%	80%	70%	39%	91%	25%	78%	0%
Kokrajhar										
3	*Balajan*	23%	100%	82%	70%	67%	82%	100%	77%	0%
4	*Kachugaon*	40%	100%	80%	60%	19%	82%	50%	70%	0%
Sivsagar										
5	*Gelleky*	48%	100%	83%	67%	31%	45%	100%	77%	4%
6	*Patsaku*	52%	100%	92%	67%	31%	45%	100%	77%	4%
Tinsukia										
7	*Kakopathar*	50%	100%	90%	44%	34%	100%	75%	70%	0%
8	*Hapjan*	65%	100%	100%	75%	60%	64%	100%	77%	0%
Golaghat										
9	*Missamora*	93%	100%	90%	80%	50%	91%	25%	78%	43%
10	*Bokaghat*	87%	100%	90%	80%	50%	91%	25%	78%	0%
Jorhat										
11	*Titabor*	85%	100%	73%	10%	56%	45%	50%	84%	0%
12	*Bhogamukh*	83%	100%	82%	50%	53%	55%	50%	94%	0%
Goalpara										
13	*Matia*	87%	100%	70%	70%	25%	55%	25%	94%	0%
14	*Agia*	83%	100%	90%	65%	25%	0%	0%	47%	0%
Kamrup (R)										
15	*Uparhali*	80%	100%	100%	80%	55%	91%	100%	94%	0%
16	*Chayagaon*	80%	100%	100%	80%	57%	91%	100%	94%	0%
Lakhimpur										
17	*Bihpuria*	90%	100%	100%	79%	61%	64%	50%	94%	0%
18	*Dhakuakhana*	88%	100%	92%	64%	88%	91%	75%	94%	36%
Sonitpur										
19	*Gohpur*	43%	100%	70%	70%	70%	64%	100%	94%	0%
20	*Rangapara*	87%	100%	100%	72%	90%	91%	100%	100%	0%
Nalbari										
21	*Mukulmua*	80%	100%	80%	80%	62%	91%	80%	84%	0%
22	*Ghograpar*	87%	100%	100%	80%	80%	91%	75%	84%	0%
	Average:	**69%**	**100%**	**87%**	**67%**	**52%**	**71%**	**65%**	**83%**	**4%**

2.1. Temperature maintenance

1. The total of 14 PHCs among 22 assessed, staff had correct knowledge of temperature range for safety of vaccine.
2. The temperature monitoring records were available at only 11 PHC. Among them, there are three PHCs where records were maintained but staff did not know correct knowledge of temperature ranges for all UIP vaccines.
3. The Contingency plan, in the event of failure of operational cold chain equipment, was available to satisfaction only at 2 of 24 PHCs.

2.2. Cold storage capacity

The vaccine storage capacities of all the PHCs were adequate to accommodate routine and campaign vaccine.

2.3. Building, equipment and transport

All the PHC had operational cold chain equipment. One PHC of Nalbari do not have freezer for making ice packs and one ILR was not functional at PHC of Sonitpur district. Apart from this, there were no shortcomings at PHC level.

2.4. Maintenance of cold chain equipment and transport

Preventive maintenance of ILR and DF was seen as the key problem at PHC level. None of the PHC had clearly defined schedule for maintenance.

2.5. Stock management

Non-standard stock books are used at most of the PHCs and diluent movements are not recorded. Sample physical count of vaccine in stock did not match the record books except for PHC of Lakhimpur and Sonitpur. Vaccines were however stored in correct order inside ILR at all the PHCs.

2.6. Effective vaccine delivery

The stock level of vaccine was sufficient till the next expected arrival at 17 of 22 PHCs. There was stock-out of vaccine at 7 PHCs. However, safety stock levels were breached at most of the sites assessed.

2.7. Diluent management

There were two important issues to be noted at PHC level with regard to diluent management:

1) Only half of the PHCs could establish the correlation between stock of diluent and vaccine. About 25% of PHCs staff could not establish the importance of using correct diluent with vaccine.
2) All except two PHCs of Goalpara district were keeping diluent in ILR atleast 24 hours prior to vaccination.

This implies that though there are knowledge gaps in significant number of districts, the correct use of diluent is limited to poor matched supply from districts.

2.8. Effective use of VVM

The important finding with regard to use of VVM at the service delivery level was that though health workers/vaccinators understand and interpret VVM very well, it is poorly referred to during the sessions.

2.9. Wastage control

The wastage monitoring system, knowledge of health workers in basic principles of vaccine wastage, compilation and use of wastage data is completely missing at PHC level.

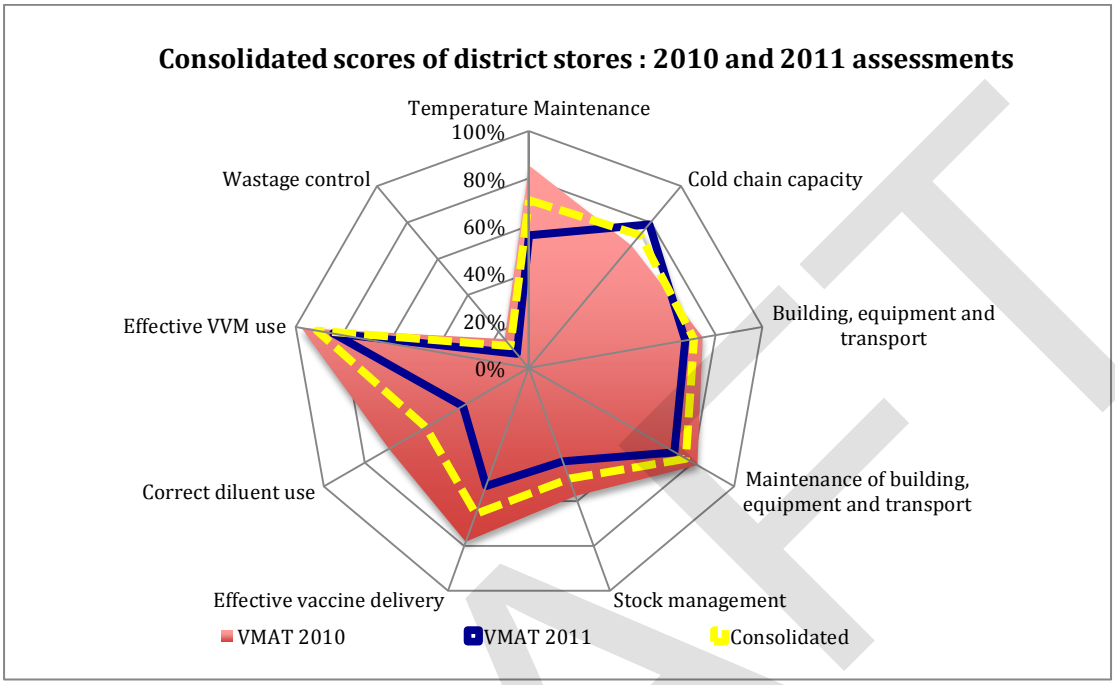
3. Recommendations

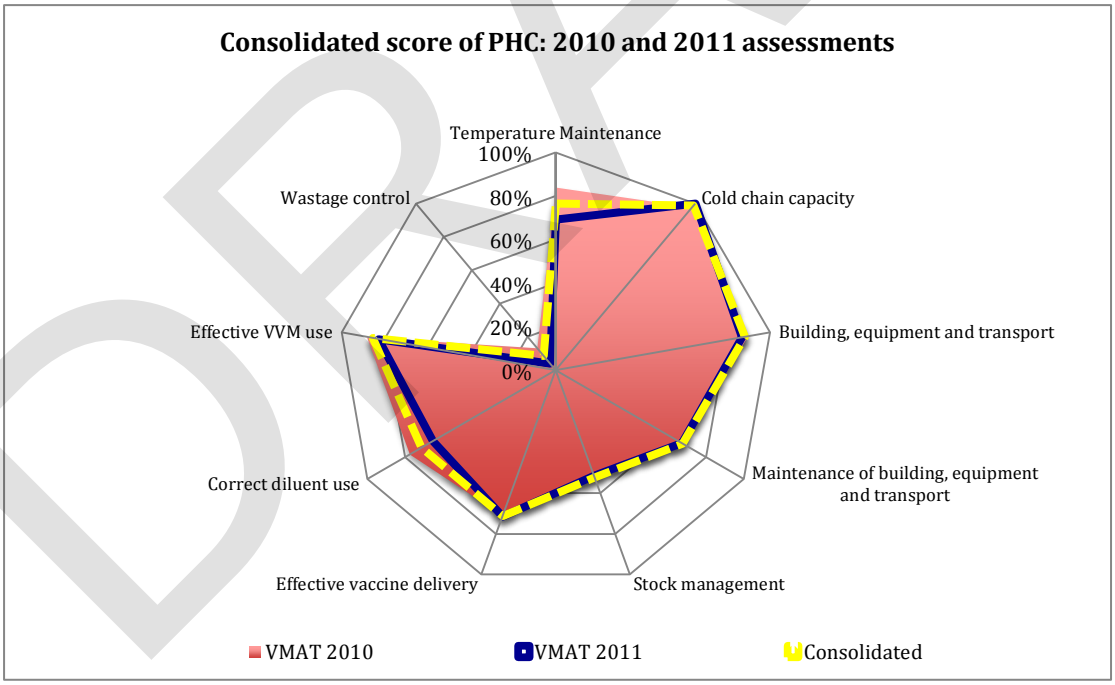
S. No	Recommendation	Time frame			Applicable at these levels		
		Immediate	Medium term (within 1 year)	Long term (more than 1 year)	District	PHC	Management & Administration
1	Establish a state level logistics working group with members from state , districts and partner agencies to track and follow up with the recommendations of VMAT first and second round.	✓			✓		✓
2	The logistics working group should meet once every month and report the status of implementation to health Secretary of Assam.		✓		✓		✓
3	The representatives from national immunization division of MOHFW and partner agencies should attend the meeting once every six months. The key bottlenecks related to procurement and supply should be reported to Joint secretary for child health/immunization, MOHFW.		✓				✓
	Related to infrastructure						
4	Operationalize all districts with presence of cold room to operate as regional store such that they store and supply the vaccine to near by district.		✓		✓		
5	Install the temperature chart recorders and alarm system for all the cold rooms at district level	✓			✓		
6	Allocate the dedicated space for dry and cold storage at all the districts and PHCs. The space should accommodate the ILRs and DFs, including provision for additional equipment based on next 10 years projection, shelves for dry storage, space of ice pack conditioning, storage for cold boxes and vaccine carrier supply, space for spare parts (at district level), space for generator with clear ventilation and office space for keeping records and computer equipment.			✓	✓	✓	

S. No	Recommendation	Time frame			Applicable at these levels		
		Immediate	Medium term (within 1 year)	Long term (more than 1 year)	District	PHC	Management & Administration
7	Provide operational generator of 15 KVA each for power back to ILRs/DFs at all the district stores along with provisions of fuel supply, sufficient to operate for at least 72 hours without electricity.		✓		✓		
8	Provide vehicle for vaccine transportation to the districts of Goalpara and Golaghat.		✓		✓		
9	Clean the district and PHC stores by removing the condemned items and ensure that floors are mopped and washed every week. The pest control should be done once every 6 months.	✓			✓	✓	
10	Repair the non functional WIC of Goalpara district and ILR of Gohpur PHC (Sonitpur district)	✓			✓		
11	Provide deep freezer to Goalpara district store and Mukulmua PHC of Nalbari district.	✓			✓	✓	
	Related to capacity building of staff						
12	Conduct the quality training programs for all the district and PHC cold chain handlers using the methodology of the national cold chain handlers training program.		✓		✓	✓	
13	All cold chain handlers should be retrained through a refresher-training program once every two years.			✓	✓	✓	
14	Ensure the learnings from training are supported through supportive supervision. Each cold chain site should receive supervisory visit every quarterly and all visits must be followed by a follow-up visit within a month.		✓		✓	✓	
	Related to practices followed						
15	The monthly temperature monitoring reports should be prepared and submitted to DIO (of all PHCs and district store) and district reports to be shared with CCO. The situations of temperature excursions should be immediately reported to cold chain technician of the district for corrective action.		✓		✓	✓	

S. No	Recommendation	Time frame			Applicable at these levels		
		Immediate	Medium term (within 1 year)	Long term (more than 1 year)	District	PHC	Management & Administration
16	Prepare and distribute generic contingency plan to all the sites. The contingency plan should be customized by all the sites with names of alternate locations of nearby stores. The contingency plan should be rehearsed once in every 6 months.		✓		✓	✓	
17	Issue the job aids, posters and guidelines for preventive maintenance of cold chain equipment. The cold room locations should have poster on preventive maintenance posted in the stores. The preventive maintenance should be carried out fortnightly or as recommended by CCO/DIO based on local climatic conditions.		✓		✓	✓	
18	Supply and implement the standard format stock book to all the stores for recording stock movements.	✓			✓	✓	
19	All the districts to prepare annual vaccine distribution plan. Prepare the quarterly distribution report reflecting actual distribution of vaccine and related supplies compared to planned quantities and schedules. The reports from all the districts should be shared with SIO on quarterly basis.	✓			✓	✓	
20	Prepare the standard supportive supervision checklist, which should be used for supervisory visits and guide checkpoints of all the above practices. The supervisory visit report should be shared with SIO and CCO on quarterly basis.	✓			✓		✓

Annexure 1: Consolidated results of phase I and Phase II assessments





Level	Assessment phase	Vaccine arrival procedures	Temperature Maintenance	Cold chain capacity	Building, equipment and transport	Maintenance of building, equipment and transport	Stock management	Effective vaccine delivery	Correct diluent use	Effective VVM use	Wastage control
State level	VMAT 2010	**56%**	**91%**	**58%**	**81%**	**76%**	**44%**	**79%**	**0%**	**100%**	**67%**
District stores	VMAT 2011	N/A	56%	79%	67%	71%	42%	53%	32%	84%	8%
	VMAT 2010		86%	67%	74%	82%	57%	78%	68%	98%	16%
	Consolidated		**71%**	**73%**	**71%**	**77%**	**50%**	**66%**	**50%**	**91%**	**12%**
PHC	VMAT 2011		69%	100%	87%	67%	52%	71%	65%	83%	4%
	VMAT 2010		84%	98%	90%	68%	53%	71%	77%	88%	13%
	Consolidated		**77%**	**99%**	**88%**	**67%**	**52%**	**71%**	**71%**	**85%**	**9%**

Annexure 2: Consolidated list of recommendations

S. No	Recommendation	Phase	Time frame			Applicable at these levels			
			Immediate	Medium term (within 1 year)	Long term (more than 1 year)	State	District	PHC	Management & Administration
1	Establish a state level logistics working group with members from state, districts and partner agencies to track and follow up with the recommendations of VMAT first and second round.	□□□□	✓			✓	✓		✓
2	The logistics working group should meet once every month and report the status of implementation to health Secretary of Assam.	□□□□		✓			✓		✓
3	The representatives from national immunization division of MOHFW and partner agencies should attend the meeting once every six months. The key bottlenecks related to procurement and supply should be reported to Joint secretary for child health/immunization, MOHFW.	□□□□		✓					✓
4	Appoint the refrigeration technician at Cachar district store, as the position is vacant for past few months.	2010		✓			✓		✓
	Related to infrastructure								
5	Refurbish the state vaccine store as per the suggested layout plan in figure 2 to accommodate and install the new WIC and WIF.	2010	✓			✓			
6	Dismantle the non-functional WIC (aged more then 20 years) at Cachar and Dibrugarh district and utilize the space for installation of newly supplied cold room based on the recommended layout plan.	2010	✓				✓		
7	The building hosting the state vaccine store should be dedicated for vaccine and related supplies only. Dedicate and relocate other unrelated supplies to another location.	2010		✓		✓			
8	Install all the newly supplied cold rooms at state and regional stores on priority.	2010	✓			✓	✓		
9	Operationalize all districts with presence of cold room to operate as	□□□□		✓			✓		

S. No	Recommendation	Phase	Time frame			Applicable at these levels			
			Immediate	Medium term (within 1 year)	Long term (more than 1 year)	State	District	PHC	Management & Administration
	regional store such that they store and supply the vaccine to near by district.								
10	Equip the cold rooms in the state with 24x7 temperature monitoring system preferably computer based system where temperature records can be stored and analyzed on computer.	2010			✓	✓	✓		
11	Install the temperature chart recorders and alarm system for all the cold rooms at district level	□□□□	✓				✓		
12	Refurbish the vaccine stores (regional, district and PHC) (including space for ILR/DF, dry storage (for syringes and diluent) and store keeper's office) based on the good warehouse practices recommended by WHO (reference document WHO/V&B/02.34).	2010		✓		✓	✓	✓	
13	Allocate the dedicated space for dry and cold storage at all the districts and PHCs. The space should accommodate the ILRs and DFs, including provision for additional equipment based on next 10 years projection, shelves for dry storage, space of ice pack conditioning, storage for cold boxes and vaccine carrier supply, space for spare parts (at district level), space for generator with clear ventilation and office space for keeping records and computer equipment.	□□□□			✓		✓	✓	
14	Provide the dedicated power supply backup (auto start Generator with capacity of 5 or 15 KVA depending on number of refrigeration units) at district stores	2010		✓			✓		
15	Provide operational generator of 15 KVA each for power back to ILRs/DFs at all the district stores along with provisions of fuel supply, sufficient to operate for at least 72 hours without electricity.	□□□□		✓			✓		
16	A new vehicle for vaccine delivery should be allotted to the districts of Cachar, Karimganj, Morigaon, Nagaon, Dhemaji, Kamrup, Darrang and Barpeta district. The vehicle should have local service support including locally available spare parts. The vehicles intended for hilly areas	2010		✓			✓		✓

S. No	Recommendation	Phase	Time frame			Applicable at these levels			
			Immediate	Medium term (within 1 year)	Long term (more than 1 year)	State	District	PHC	Management & Administration
	should have four wheel drive provision with minimum ground clearance as required.								
17	Provide vehicle for vaccine transportation to the districts of Goalpara and Golaghat.	????		✓			✓		
18	Auction/dispose the condemned items (cold chain refrigeration units (ILR/DF/Cold boxes and vaccine carrier that are beyond economic repair) to clear the room space at district stores.	2010	✓			✓	✓	✓	
19	Clean the district and PHC stores by removing the condemned items and ensure that floors are mopped and washed every week. The pest control should be done once every 6 months.	????	✓				✓	✓	
20	Repair the non functional WIC of Goalpara district and ILR of Gohpur PHC (Sonitpur district)	????	✓				✓		
21	Replenish the vaccine storage capacity by installing new ILR/Dfs as per the requirement by computing peak vaccine volume loads for specific districts of kamrup, Darrang and Berpeta districts.	2010		✓			✓	✓	
22	Provide deep freezer to Goalpara district store and Mukulmua PHC of Nalbari district.	????	✓				✓	✓	
23	For the maintenance of solar refrigerators used for UIP program, it is recommended that: a. Batteries to be replaced every five years; b. Solar panels should be cleaned from dust every week;	2010	✓					✓	
	Related to capacity building of staff								
24	Conduct the quality training programs for all the district and PHC cold chain handlers using the methodology of the national cold chain handlers training program.	????		✓			✓	✓	
25	All cold chain handlers should be retrained through a refresher-training program once every two years.	????			✓		✓	✓	
26	Ensure the learnings from training are supported through supportive	????		✓			✓	✓	

S. No	Recommendation	Phase	Time frame			Applicable at these levels			
			Immediate	Medium term (within 1 year)	Long term (more than 1 year)	State	District	PHC	Management & Administration
	supervision. Each cold chain site should receive supervisory visit every quarterly and all visits must be followed by a follow-up visit within a month.								
	Related to practices followed								
27	File and retain (for a period of atleast four years) the complete set of documents related to vaccine received from manufacturer at state vaccine store (Lot release certificates, Invoices, airway bill copy, inspection note and allocation list)	2010	✓			✓			
28	Strengthen the temperature monitoring through strict supervision by medical officers/DIOs. Include supervision checklist for monitoring and documenting supervisory visits	2010	✓			✓	✓	✓	✓
29	The monthly temperature monitoring reports should be prepared and submitted to DIO (of all PHCs and district store) and district reports to be shared with CCO. The situations of temperature excursions should be immediately reported to cold chain technician of the district for corrective action.	□□□□		✓			✓	✓	
30	Prepare and distribute generic contingency plan to all the sites. The contingency plan should be customized by all the sites with names of alternate locations of nearby stores. The contingency plan should be rehearsed once in every 6 months.	□□□□		✓			✓	✓	
31	Prepare/adopt the Standard Operating Procedures for cold chain maintenance and disseminate using various mechanisms like booklet, job aids and posters.	2010	✓			✓	✓	✓	
32	Issue the job aids, posters and guidelines for preventive maintenance of cold chain equipment. The cold room locations should have poster on preventive maintenance posted in the stores. The preventive maintenance should be carried out fortnightly or as recommended by CCO/DIO based on local climatic conditions.	□□□□		✓			✓	✓	

S. No	Recommendation	Phase	Time frame			Applicable at these levels			
			Immediate	Medium term (within 1 year)	Long term (more than 1 year)	State	District	PHC	Management & Administration
33	Adopt the standard format for temperature monitoring and stock book maintenance as recommended by MOHFW. Include diluent bundling and recording in standard recording procedures. Standardize the vaccine and diluent unit in doses for recording and indent.	2010	✓			✓	✓	✓	
34	Supply and implement the standard format stock book to all the stores for recording stock movements.	□□□□	✓				✓	✓	
35	Prepare and implement the vaccine distribution plan for the districts of Kamrup and Darrang based on the requirement, adjusted frequency depending on cold chain capacity of district stores.	2010	✓				✓		
36	All the districts to prepare annual vaccine distribution plan. Prepare the quarterly distribution report reflecting actual distribution of vaccine and related supplies compared to planned quantities and schedules. The reports from all the districts should be shared with SIO on quarterly basis.	□□□□	✓				✓	✓	
37	Prepare the standard supportive supervision checklist, which should be used for supervisory visits and guide checkpoints of all the above practices. The supervisory visit report should be shared with SIO and CCO on quarterly basis.	□□□□	✓				✓		✓
38	Establish the stock levels (safety and maximum) for all districts, regional and state vaccine store. Establish the indent (re-ordering) system that strictly adheres to these set stock levels.	2010	✓			✓	✓	✓	