

Nepal Effective Vaccine Management Assessment 2017



Government of Nepal
Ministry of Health
Department of Health
Services

Foreword

EVM is the first and foremost a quality management tool that combines a structured assessment with supplementary guidance materials. The standard global tool is designed to help countries to build a vaccine supply chain based on the well-established principles of quality management used throughout the industrialized world.

Based on the provisions of the National Immunization Program of the Nepal, and following the country plans to introduce new vaccines using GAVI co-financing mechanisms, an EVM assessment was carried out from **28th March to 10th May 2017** , generating an evidence for developing plan to improve management, monitoring and supervision of the country immunization supply chain.

The EVM initiative provided the materials needed to monitor and assess vaccine supply chain and to help countries to improve their supply chain performance. The EVM tool was used to assess the quality and sufficiency of the seven component elements of an effective supply chain. EVM's scope and focus was based on the nine global criteria (Vaccine arrival, Temperature, Storage Capacity, Building/Equipment/Transport, Maintenance, Stock Management, Distribution, Vaccine Management and Information System/Supportive Management Functions) each of which was validated against records kept over a recent 12 months period during the assessment. Ultimately, systematic assessment of vaccine management procedures was carried out in order to lead to improve performance and as a product, this document has been developed.

The development of this document would not have been possible without extensive hard work of a group of experts and professionals and I sincerely thank them for their dedication and input. I would like to express my sincere gratitude towards the entire assessor's team who committed themselves throughout the overall process of EVM Assessment, thus bringing this document to its final shape.

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We would also like to thank **Mr. Bikash Lamichhane** (Former Director of CHD), **Mr, Mukunda Raj Gautam** and **Mr. K. B. Chand** (Former Chiefs, Immunization Section CHD),**Dr. Jhalak Gautam** (Chief, EPI Section CHD), and **Mr. Bharat Bhandari** (EPI Officer, CHD). Our solemn appreciation goes to **Ms. Sangita Shah** (Former chief, Cold chain),**Ms. Sachita Joshi** (Current Chief, Cold Chain), **Mr. Bade babu Thapa** (Pharmacist Officer, Cold chain and Vaccine Distribution Section LMD) for their guidance.

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Preamble

This report presents the findings of an Effective Vaccine Management (EVM) assessment of Nepal which was carried out in **March to May 2017**. 56 storage and health facilities (1 PR, 6 SN, 20 LD and 29 SD) were visited and their records were assessed for the 12 month period July 15, 2015 to July 14, 2016.

An EVM assessment provides a systematic analysis of strengths and weaknesses across the supply chain; it is part of the EVM process which is designed to embed good vaccine storage and distribution practices.

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Executive summary

One of the fundamental pillars for national immunization program is the immunization supply chain management and Effective Vaccine Management (EVM). One of the basic requirements for the country to identify interventions to improve the effective vaccine management system is to conduct periodic EVM assessment using standard tools. Based on the EVM assessment, an improvement plan is developed which would be the milestone indicators to assess the investment made to strengthen the EVM. In Nepal, EVM assessment was carried out from March to May 2017. The EVM assessment was conducted in four tiers. First tier was the national vaccine store (CVS), the second was the sub-national vaccine store (RMS), the third was lowest distribution center (DVS) and the fourth one was service points (Health facility).

The assessment was conducted in all sub-national vaccine store, randomly selected lowest distribution center and service points.

Sampling process was followed by data collection. For the data collection, independent enumerators were selected who had professional experience on surveys and educational qualification of health background (pharmacy, nursing and public health with minimum qualification of certificate level). Seven day intensive training sessions was provided to train the enumerators with EVM Assessment Checklist (questionnaire) generated from EVM Assessment Tool (version 1.1.0). To ensure quality of assessment, a quality assurance team was formed from center (CHD, LMD), region (RMS, RHD), and UNICEF.

The EVM assessment identified the key strengths and weaknesses in nine different areas of vaccine management at each of four levels of the vaccine supply chain, and make recommendations to address any weaknesses. The four supply chain levels were:

- PR Primary level
- SN Sub-national level
- LD Lowest distribution level
- SP Service point level

The nine areas (criteria) of vaccine management are:

- E1 Vaccine & commodity arrival procedures
- E2 Vaccine storage temperatures
- E3 Cold & dry storage capacity
- E4 Buildings, CC equipment & transport
- E5 Maintenance
- E6 Stock management
- E7 Effective distribution
- E8 Good vaccine management practices
- E9 Information systems and supportive management functions

A systematic sample of vaccine storage facilities was surveyed and the data was collated and assessed by supply chain level.

Table 1. EVM scores for category and level

EVM Level and category	E1	E2	E3	E4	E5	E6	E7	E8	E9
Primary	97	73	85	78	76	94	76	96	83
Sub National	-	92	84	90	89	90	66	93	70
Lowest Delivery	-	84	94	92	71	82	74	93	80
Service Point	-	70	80	75	45	53	72	91	66
	97	79.8	86	84	70.3	79.8	72	93.3	74.8

Out of the 9 categories, 4 categories namely -vaccine & commodity arrival procedures; cold and dry storage capacity; buildings, cold chain equipment and transport and good vaccine management practices has achieved more than 80%. Among supply chain level, the EVM scores in 7 out of 9 categories in service point. The overall EVM score for 2017 is 82%.

There has been improvement in the EVM scores in 2017 from that of EVM assessment 2014. Different intervention implemented 2015-17 has been attributed to improvement in the scores. Further improvement in the scores will require significant investment in effective distribution, maintenance of the temperature in the cold chain devices and increased attention for cold chain system in the service points.

Acronyms

°C	degrees centigrade
AD	Auto-disable (syringe)
BCG	bacille Calmette-Guérin (tuberculosis vaccine)
CC	Cold Chain
DTP	Diphtheria, Tetanus and Pertussis vaccine
EEFO	Earliest-Expiry-First-Out
EPI	Expanded Programme on Immunisation
EVM	Effective Vaccine Management
FIC	Fully Immunized Child
GAVI	Global Alliance for Vaccines and Immunisation
HepB	Hepatitis B vaccine
Hib	<i>Haemophilus influenzae b</i>
ILR	Ice-lined refrigerator
JE	Japanese encephalitis vaccine
LD	Lowest delivery level store
MoH	Ministry of Health
OPV	Oral Polio Vaccine
PAR	Product Arrival Report
PR	Primary store
SN	Sub-national store
SOP	Standard Operating Procedure
SP	Service point (health facility)
UNICEF	United Nations Children's Fund
VAR	Vaccine Arrival Report
VVM	Vaccine Vial Monitor
WHO	World Health Organization

Terms of reference

The objectives of this assessment was to have systematic review of vaccine management procedures.

EVM is a quality management tool that combines a structured assessment with supplementary guidance materials. The standard global tool is designed to help countries to build a vaccine supply chain based on the well-established principles of quality management (ISO 9000 series of standards).

EVM's scope and focus will be based on the nine global criteria listed below, each of which must be validated against records kept over a previous 12 months period of assessment.

1. Vaccine Arrival Procedures (E1): Pre-shipment and arrival procedures ensure that every shipment from the vaccine manufacturer reaches the receiving store in satisfactory condition and with correct paperwork.
2. Vaccine Storage Temperatures Monitoring (E2): All vaccines and diluents are stored and distributed within WHO recommended temperature ranges.
3. Cold & dry storage capacity (E3): Cold storage, dry storage and transport capacity is sufficient to accommodate all vaccines and supplies needed for the program.
4. Buildings, CC equipment & transport system (E4): Buildings, cold chain equipment and transport systems enable the vaccine and consumables supply chain to function effectively.
5. Maintenance (E5): Maintenance of buildings, cold chain equipment and vehicles is satisfactory.
6. Stock Management (E6): Stock management systems and procedures are effective.
7. Distribution (E7): Distribution between each level in the supply chain is effective.
8. Vaccine Management Practices (E8): Appropriate vaccine management policies are adopted and implemented.
9. Information Systems and Supportive Management Functions (E9): Information systems and supportive management functions are satisfactory.

The activities will be carried out based on the global guidelines for EVM assessments. A lead consultant will work closely with a team of consultants and government counterparts.

Related documents

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

Excel workbooks:

EVM assistant tool V 1.1.0

EVM_Site_Selection_Tool_v1.7

EVM Analysis and Recommendation Tool V 1

Documents:

Nepal EVM Assessment 2014

EVM-site-selection-userguide-V1.7

Training_MasterFile_EN

EVM-Introduction

EVM-assistant-tool

Pictures:

Pictures taken during assessment data collection.

Assessment team

Table 2: EVM Assessment 2017 team formed Central Store Teku, Pathlaiya, RMS, RHD Staff field visit Plan.

District	Independent Data Collection Team	Quality Assurance Team				
	Enumerators	RMS/RHD	LMD	CHD	UNICEF	Lifeline
Sunsari	Pranita Shrestha, Devina Twati	RHD/Dhankuta Prakash Adhikari		Jagan Nath Dangal		Bipul Neupane
Jhapa	Pranita Shrestha, Devina Twati	RMS Brt, Chandra Kanta Thakur	Swatantra Raj Joshi			Bipul Neupane/ Sarad Shrestha
Okhaldhunga	Ramesh Duwa, Sanjaya Ale Magar, Kiran Joshi	RMS Brt, Bharat Shah			Sumi Maskey	Bibek Thapa/ Pratap Raj Gautam
Siraha	Bigyan Thapa, Nilmani Prasad Gupta	RHD Dhankuta - Suman Tiwari		Naba Raj		Anis Shah
Sindhuli	Ramesh Duwa, Sanjaya Ale Magar, Kiran Joshi		Om Upadhyay		Abhilasha Gurung	Sabin Acharya/ Pratap Raj Gautam
Mahottari	Bigyan Thapa, Nilmani Prasad Gupta	Central Store Pathlaiya - Sanjay Shah				Anis Shah
Parsa	Jayashri Tripathi, Sajana Lama	RMS/Hetauda Raman Jha	Santosh Mishra			DB Dangri
Rautahat	Jayashri Tripathi, Sajana Lama	RMS Hetauda - Rabi	Krishna Malla			DB Dangri
Lalitpur	Priyanka Chaudhary, Ankita Ojha	RHD/Hetauda - Chandra Man Tamang			Karuna L. Shakya	Alisha Bhomi
Nuwakot	Priyanka Chaudhary, Ankita Ojha		Krishna Pd. Subedi		Ravi Vitrakoti	Iman Thapa
Lamjung	Reja Thapa, Sakun Subba	Cold chain/ RHD - Badri	Bade Babu Thapa			Madan Chand
Parbat	Reja Thapa, Sakun Subba	Vaccine store pokhara - Hem	Bade Babu Thapa			Madan Chand

District	Independent Data Collection Team	Quality Assurance Team				
		Enumerators	RMS/RHD	LMD	CHD	UNICEF
		Lal Subedi				
Nawalparasi	Sukunj Tamang, Dipika Khatri	RMS - Butwal - Hari Acharya		Rajendra Pd. Ghimire		Krishna H Mainali
Kapilbastu	Sukunj Tamang, Dipika Khatri	RMS Butwal Kafle	Kushu Ram Adhikari	Basanta Shrestha		Krishna H Mainali
Salyan	Bishnu Basnet, Sudikshya Dhanju	RMS Nepalgunj - Janak Giri				Manjita Sharma/Neha Malla
Kathmandu	Bishnu Basnet, Sudikshya Dhanju				Karuna L. Shakya	Manjita Sharma/Neha Malla
Kalikot	Amit B.K., Abedan Tamang	RHD - Surkhet RMS Kapil				Dr. Mukesh Pokhrel
Bardiya	Amit B.K., Abedan Tamang	RMS Nepalgunj -1 Dilli	Sharada Neupane - (including - RMS NPJ		Indrakala Tamang	Dr. Mukesh Pokhrel
Kailali	Samana Gelal, Sangeeta Chaudhary	RMS Dhangadhi CCO Padam Bista + Sahani	Shanti Ram Khatiwada -			Mohan D. Joshi/ Pooja Karn
Darchula	Samana Gelal, Sangeeta Chaudhary	RMS Dhandagi -Basanta Chand and RHD focal person		Bharat Bhandari KB Chand	Dr. Ashish KC Indrakala Tamang	Mohan D. Joshi/ Pooja Karn

1. Introduction

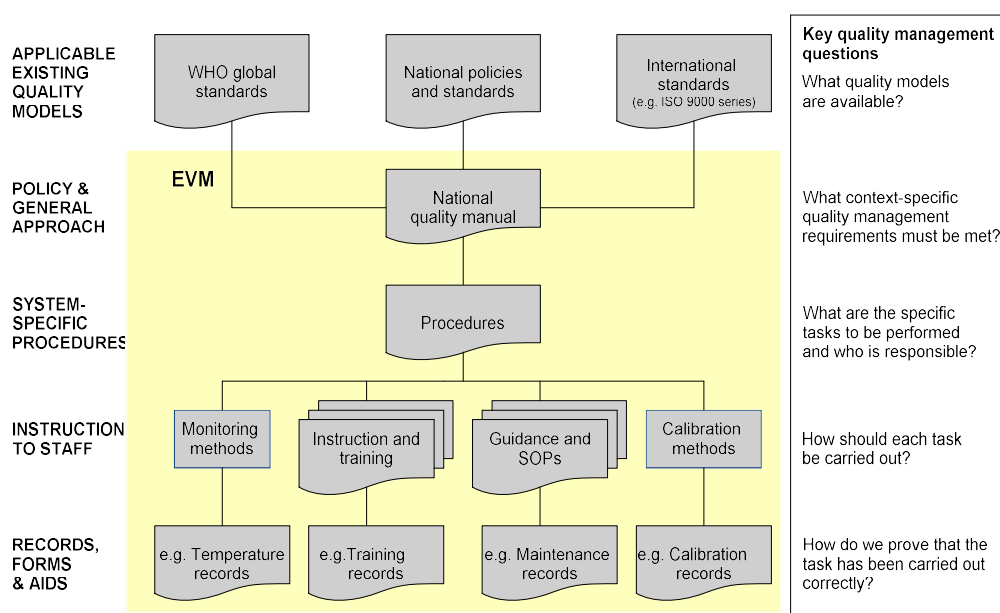
1.1 Introduction to EVM

The EVM process is first and foremost about embedding **good storage and distribution practices**. The package has been designed so that it can be used both as an **assessment tool** for the systematic analysis of strengths and weaknesses across the supply chain but also as a **supervisory aid** to monitor and support the long-term progress of individual facilities.

Good storage and good distribution practices for temperature-controlled pharmaceuticals - vaccines and products are the focus of legislative and regulatory control of the country. EVM follows the well-established principles of **quality management**.

Figure 1 illustrates the hierarchy of documentation needed to support this approach. EVM covers the yellow shaded area of the diagram.

Figure 1 – Quality Management documentation



The EVM tool is used to assess the quality and sufficiency of the seven component elements of an effective supply chain: buildings; storage and transport capacity; cold chain equipment; vehicles; repairs and maintenance; training and the management systems needed for the effective operation and control of the system.

An EVM assessment uses a structured questionnaire; this questionnaire is designed to allow evaluation of four distinctly different levels in the supply chain, as follows:

1. The primary (PR – National Store) level store where vaccine is received directly from the vaccine manufacturer or from an international supplier. Typically vaccine is stored in large cold rooms and freezer rooms.

In Nepal there are two primary stores. First is the Central Vaccine Store in LMD, Teku Kathmandu. It is located close to international airport and vaccine arriving to the country passes through this facility. It has 5 Walk-in Coolers (WIC) and 2 Walk-in Freezers (WIF).

The second Central Store is in Pathlaiya located in the Central Region of Nepal, in south, close to border with India. It receives vaccines from Teku PR. Pathlaiya Store receives syringes, safety boxes, medicines, cold chain equipment directly from manufacturers by road, from India (transit from sea ports or other locations). Pathlaiya Store has 2 WIC and 1WIF.

- 1 The Sub-national (SN) level where vaccine is received from the primary store, stored for an agreed period, and then distributed to lower levels stores or to health facilities. These stores may have a cold room and/or a number of vaccine refrigerators and freezers.

There are six sub-national stores called the Regional Medical Stores. They receive vaccine and immunization supplies from central level and distribute it to district level stores in Nepal.

- 2 The lowest delivery level (LD) store where vaccine is received, either from the primary store or from a sub-national store. From this point it is distributed directly to service delivery points.

There are 75 LD stores according to number of districts in Nepal. Sixty five districts receive vaccine from RMS and ten districts (in Central Region close to Kathmandu) receive vaccine directly from Central vaccine Store in Teku.

District stores distribute vaccine to the lower level.

- 3 Service delivery points (SP) such as primary health care centers and health posts, where vaccine is stored for a short time before delivery to the target population – usually in a single refrigerator, but also, on a very short-term basis, in vaccine cold boxes or vaccine carriers.

Immunization services is delivered via PHCC, HP, PHC/ORC clinics, EPI outreach (government), NGOs and private clinics.

The EVM tool is based on nine basic criteria, each of which is divided into a number of requirements and sub-requirements; together these characterize the fundamental qualities of a good vaccine supply chain. Compliance with each of these sub-requirements is assessed using a series of focused questions, which are numerically scored.

A single common list of requirements and questions is used for the entire supply chain assessment. The EVM tool automatically filters this common list to create questionnaires that are specifically directed at each of the four levels described above. These level-specific questionnaires can be further filtered to pick out only the most critical indicators. In this way an assessor can choose to carry out a full EVM assessment at a specific facility or a rapid review assessment.

Full assessments will typically be used by national staff to carry out long-term monitoring of individual facilities to achieve specific and targeted improvements. Review assessments are intended to be used to gain an overall insight from a carefully selected sample of the supply chain. Generally speaking this type of assessment will be carried out by national or international teams, over a short period of time.

In addition to the overall filtering process, the tool dynamically adjusts the questions offered in response to the assessor's answers to certain country- or level-specific conditions. For example, if

refrigerated trucks are used to distribute vaccines, a set of questions is offered covering this type of equipment.

In its current form, the tool summarizes assessment results in two ways:

- The score achieved against each of the criteria that is relevant to the level being assessed.
- The score achieved against indicators classified in accordance with seven categories of question – those relating principally to: buildings; storage capacity; cold chain equipment; vehicles; repairs and maintenance; training, and management.

1.2 Site selection for 2017 EVM Assessment in Nepal

The assessment sites were chosen by using the EVM site selection tool and standard selection process.

Primary sampling units were LD stores (district level vaccine stores), where vaccines are stored and distributed. All LD (75 DVS) was in the sampling frame.

A two stage sampling approach was used: at the first stage primary sampling units were selected following a systematic sampling using probability proportional to their size (PPS).

The sample size of 20 was determined based on the number of lowest delivery level stores (75) and accepted requirements regarding the Confidence level (80%) and Precision ($\pm 10\%$), using the sample size reference table as below.

Table 3. Sample size reference table

Number of LD stores for sample selection	80% Confidence level and Precision 10%
15	10
20	12
25	14
40	17
50	18
75	20

At the second stage, service delivery points (SP) were selected for each sampled primary sampling unit using simple random sampling. 29 service delivery points were selected as sample site.

Table4. Sampling data

Number of LD stores:	75
Random number (r):	77539
Cumulative population (CP):	28624299
Sampling interval (S):	1431215

All Sub-national Vaccine Stores i.e. RMS was selected for assessment.

1.3 Assessment types used

All levels were assessed using the Full version of the EVM Assessment questionnaires.

1.4 Tool version used

During assessment EVM tool version 1.1.0 was used in English language.



1.5 Places visited

Table 5. List of assessed facilities and supply chain level

S.N.	Supply Chain Level	Administrative Area	Facility Name
1	Primary Store	Nepal	CVS, Teku
2	Sub-National Store	Eastern	RMS, Biratnagar
3	Sub-National Store	Central	RMS, Hetauda
4	Sub-National Store	Western	WRHD, Pokhara
5	Sub-National Store	Western	RMS, Butwal
6	Sub-National Store	Mid-western	RMS, Nepalgunj
7	Sub-National Store	Far-western	RMS, Dhangadi
8	Lowest Distribution Level	Eastern	Sunsari
9	Lowest Distribution Level	Eastern	Jhapa
10	Lowest Distribution Level	Central	Okhaldhunga
11	Lowest Distribution Level	Central	Sindhuli
12	Lowest Distribution Level	Eastern	Siraha
13	Lowest Distribution Level	Central	Mahottari
14	Lowest Distribution Level	Central	Parsa
15	Lowest Distribution Level	Central	Rautahat
16	Lowest Distribution Level	Central	Lalitpur
17	Lowest Distribution Level	Central	Nuwakot
18	Lowest Distribution Level	Western	Lamjung
19	Lowest Distribution Level	Western	Parbat
20	Lowest Distribution Level	Western	Nawalparasi
21	Lowest Distribution Level	Western	Kapilbastu
22	Lowest Distribution Level	Mid-western	Kalikot
23	Lowest Distribution Level	Mid-western	Bardiya
24	Lowest Distribution Level	Mid-western	Salyan
25	Lowest Distribution Level	Central	Kathmandu
26	Lowest Distribution Level	Far-western	Darchula
27	Lowest Distribution Level	Far-western	Kailali
28	Service Point	Eastern	Itahari PHC
29	Service Point	Eastern	Raniban PHC
30	Service Point	Eastern	Manebhanjyang PHC
31	Service Point	Central	Gausala PHC
32	Service Point	Central	Samsi HP
33	Service Point	Central	Sedhwa HP
34	Service Point	Central	Kothariya PHC

S.N.	Supply Chain Level	Administrative Area	Facility Name
35	Service Point	Central	Santpur HP
36	Service Point	Central	Bastipur
37	Service Point	Central	Sirthauli
38	Service Point	Central	Gotikhel
39	Service Point	Central	Bhattedanda
40	Service Point	Central	Kharanitar PHC
41	Service Point	Central	Bhadratar
42	Service Point	Western	Jayanagar
43	Service Point	Western	Maharajgunj
44	Service Point	Western	Dhumkauli PHC
45	Service Point	Western	Ishaneshwor HP
46	Service Point	Western	Chandraswore
47	Service Point	Western	Gauda PHC
48	Service Point	Western	Ranipani HP
49	Service Point	Western	Huwas HP
50	Service Point	Mid-western	Rajapur
51	Service Point	Mid-western	Mehelmundi HP
52	Service Point	Mid-western	Tharmare PHC
53	Service Point	Mid-western	Kalche HP
54	Service Point	Far-western	Gokuleswore
55	Service Point	Far-western	Pasti
56	Service Point	Far-western	Tikapur

2. Country background

Nepal is a landlocked country which shares its northern border with China and eastern, western and southern borders with India. It covers a total land area of 147,181 square kilometres. Topographically, Nepal is divided into three distinct ecological zones: the mountain (Himal), hill and flat (Terai). At the time of assessment the country was divided into five administrative regions and 75 administrative districts. Following the assessment, as guided by Nepal's constitution of 2015, 744 Local Structures namely Rural Municipality and Municipality were formed.

Socio-Health Status

As per Nepal's constitution 2015, health is considered as a fundamental right of the people. Aligning with this principle of right based approach, government of Nepal promulgated the Nation Immunization Act in 2016. The Immunization Act states the responsibility of the state to ensure high quality vaccination to all children. In line with this act, child health division developed the comprehensive multi-year plan 2017-2022 to improve coverage, equity and quality of immunization services to targeted population. One of the key strategic pillar to achieve improved survival and development of well-being is strengthening of immunization supply chain system.

Furthermore, the comprehensive multi-year plan focuses to increase financial resource allocation for effective vaccine management at all level and identifies it as one of the mechanism to ensure high quality vaccination.

2.1 Organization of immunization services

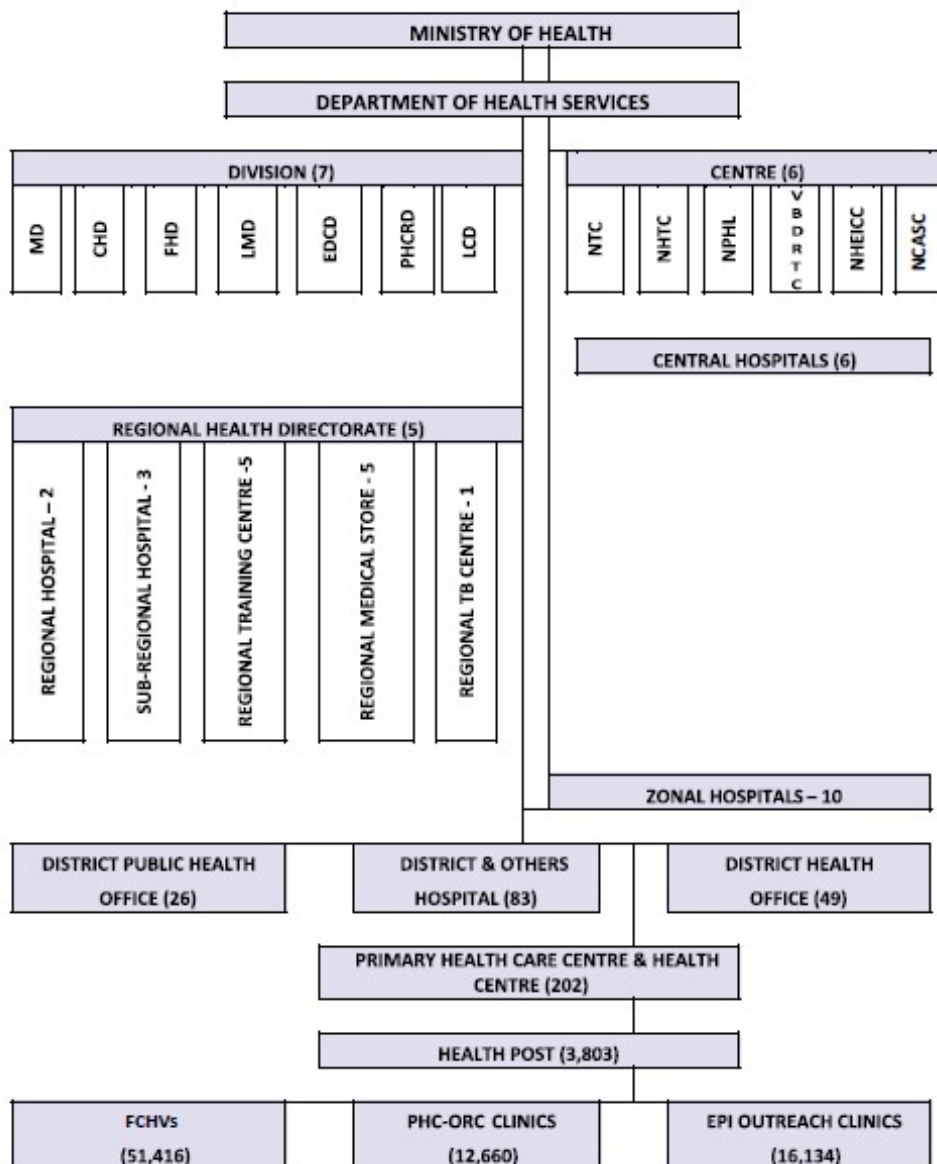
National Immunization Programme

The National Immunization Program (NIP) is the government's high priority program (P1). Currently, NIP provides vaccination against 11 vaccine preventable diseases. The immunization service is delivered through the government health network and non-governmental sectors (NGO, private and community health institutions). The government supplies all vaccines and immunization related logistics to all institutions free of cost.

Health Care Delivery Services

The Government of Nepal provides preventive, curative, promotive and rehabilitative health care services through its public health network.

Organogram 1: The Department of Health Services



With rapid urbanization, more people are migrating to urban areas. It is projected that by 2030, 60% of the population will live in urban areas. The new federal state system will have 744 Local Structures. Within the federal context, Government of Nepal, MOH has planned to establish primary hospital in each local structure and establish/strengthen health center in each ward to provide health services.

The NIP is led by the Child Health Division (CHD) of Department of Health Services (DoHS). The NIP is expanding immunization services beyond infancy.

The NIP coordinates with other divisions of DoHS including Logistics Management Division (LMD) for immunization supply chain management, Management Division (MD) for waste management, biomedical equipment maintenance and information management, National Public Health Laboratory (NPHL) for disease surveillance, National Health Education, Information and Communication Center (NHEICC) for increasing community awareness and social mobilization,

National Health Training Center (NHTC) for capacity building and Epidemiology and Disease Control Division (EDCD) for responding to VPD outbreak. The NIP also works closely with partner agencies such as WHO, UNICEF, GAVI, Rotary International, Lion’s Club, Red Cross, SABIN Vaccine Institute.

Routine Immunization Service Delivery in Rural Municipalities

Immunization services are provided mainly through fixed and outreach clinics. There are about 3-5 outreach clinics per village based on the local micro plan. However, in new federal system, micro planning of immunization program will be reviewed and re-adjusted. Some areas in mountain districts mobilize mobile teams to reach children in hard-to-reach areas. The immunization Act 2015 allows to delivery immunization services from each health workers however all the immunization sessions are conducted by AHW and ANM. Female Community Health Volunteers (FCHVs) are engaged to mobilize the eligible children for vaccination.

Routine Immunization Service in Municipalities

The immunization service is delivered through municipal clinics, government health facilities, private hospitals and private clinics in coordination with district health office. Several efforts are underway to review, reallocate session appropriately to improve coverage in urban slums and under-privileged areas.

2.2 Immunization schedule and suppliers

Table 6. Immunization schedule

Type of vaccine	No. doses	Target age	Timeline
BCG ¹	1	At birth or on first contact with health institution	Current schedule
Oral polio vaccine(OPV)	3	6, 10 and 14 weeks of age	Current Schedule
Pentavalent (DPT+HepB+Hib) ²	3	6, 10 and 14 weeks of age	Current schedule
IPV	1	14 weeks of age	Current schedule
flPV	2	6 and 14 weeks of age	Current schedule
Pneumococcal (PCV)	3	6 and 10 weeks and 9 month of age	Current schedule
Measles-rubella	2	MR-1 at 9 months MR-2 at 15 months of age	Current schedule
Low dose diphtheria toxoid(Td)	2	Pregnant women as per national guideline	Current schedule
Japanese encephalitis	1	12 months of age	Current schedule
Rota virus vaccine	2	6 weeks and 10 weeks	Planned - 2018
HPV	2	9-13 years age (6 month interval)	Planned - 2018

¹ Bacille Calmette Guerin Vaccine

² Diphtheria, Tetanus, Pertussis, Hepatitis B and Haemophilus influenza type B

2.3 Planned vaccine introductions

The NIP has planned to expand immunization services for under-used and new vaccines beyond infancy (cMYP 2017-2022). Thus, NIP plans to introduce Typhoid, Cholera, Rota and HPV vaccines.

2.4 Vaccine volume data

Table 7. Vaccine volumes per dose

VACCINES & VACCINATIONS										
Routine Vaccines	Vaccination objectives & targets			vaccine presentation	Vaccine wastage (%)	Administration	Dilution syringes	Volume per target, cm3		
	Schedule	Target (%)	Coverage (%)					vaccines	diluents	injection eq
BCG	1	2.3%	100%	20	74%	ADS_0.05ml	Sdilution_2ml	4.6	2.7	
bOPV	3	2.3%	100%	10	23%	Oral		3.8	-	
DTP-HepB-Hib	3	2.3%	100%	10	21%	ADS_0.5ml		10.5	-	
Measles	2	2.3%	100%	10	57%	ADS_0.5ml	Sdilution_5ml	12.1	18.6	
Td	2	2.6%	100%	10	33%	ADS_0.5ml		9.0	-	
IPV	1	2.3%	100%	10	58%	ADS_0.5ml		5.9	-	
PCV-10	3	2.3%	100%	2	9%	ADS_0.5ml		15.8	-	
Rota_liq	2	2.3%	100%	1	5%	Oral		36.1	-	
HPV	2	11.0%	100%	2	10%	ADS_0.5ml		11.7	-	
OCV	2	2.3%	100%	1	10%	Oral		37.3	-	
JE_lyo	1	2.3%	100%	5	37%	ADS_0.5ml	Sdilution_5ml	6.7	6.7	

Note: Packed volumes of vaccines were based on WHO vaccine forecasting tool.

The currently required cold chain volume per FIC in the country is 68cm³ at service delivery level stores (+5°C) and will increase to 181cm³ due to introduction of these new vaccines by 2021.

3.1 Fixed infrastructure

Central Vaccine Store Teku

National vaccine store is located at the Teku Kathmandu LMD Compound. The building for cold chain and dry stores is not as per international standard however, most of the related functions are not compromise in delivery immunization service. Urgency to construct new building both for cold chain and dry stores has been realised by program division. Besides limitation vaccines and accessories are safe and secured.

Table 8: Type of equipment used for cold storage in Teku

S.NO.	Equipment Name	Model Number	Capacity	Quantity
1	Walk in Cooler, Hurrey		41m ³	1
2	Walk in Cooler, Hurrey		22m ³	1
3	Walk in Cooler, Hurrey		25m ³	1
4	Walk in Cooler, Everest		30m ³	1
5	Walk in Cooler, Cold bank		30m ³	1
6	Walk in Cooler, Cold bank		30m ³	1
7	Walk in Freezer, Cold bank		30m ³	1
8	Ice Line Refrigerator Haier	HBC200	360 L	4
9	Ice Line Refrigerator Dometic	TCW1152	845 L	5
10	Defreezer	MF304	282 L	1
11	Defreezer	PF230	144 L	1
12	Ice Pack Freezer	TFW791	272 L	2
13	Ice Pack Freezer	TFW800	145 L	1
14	Ice Pack Freezer	EST IR - 102	240 L	1

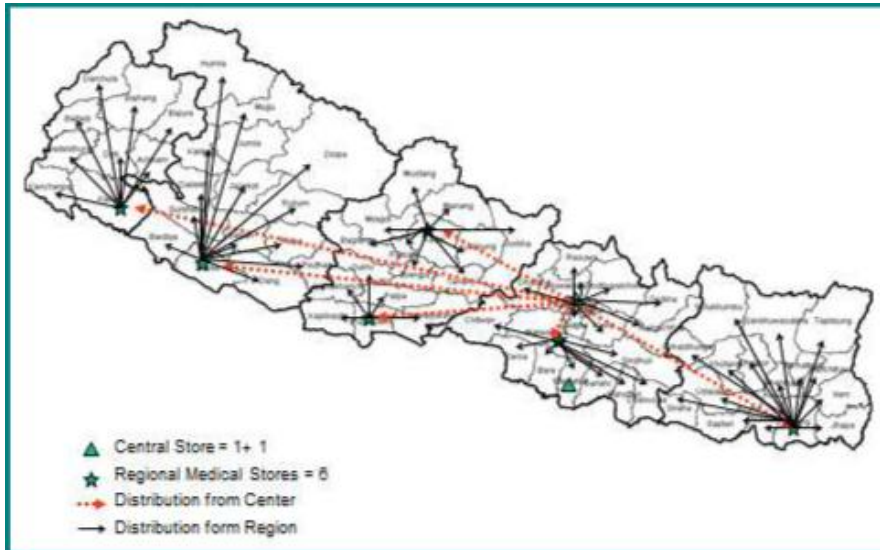
Electrical power supply is stable for the review period, since government revoked the power cuts. No major power cuts were recalled by store staff during review period. Store has 3 standby generators 2x50 kW and 1x15 kW. Generators are in good mechanical conditions. There is an adequate fuel supply as there is no major power cut. The dry store in CVS Teku has a Gross volume about 264 cubic meters or 221 cubic meters of net volume. The dry store at Teku is not sufficient to store syringes and consumables for 11 months (max. stock level), thus program division has allocated dry stores at Pathalaiya store.

Central Store Pathlaiya

Pathlaiya central medical store is located at the Pathlaiya, south part of Central Region, near to the border with India. Compound occupies about 13,500 square meters area. During review period, no vaccines were stored in Pathlaiya store and it was not selected for assessment.

3.2 Transport infrastructure

Map3: Vaccine Storage & Distribution System in Nepal



Transportation to the National Vaccine Store (PR)

Vaccines are delivered from the vaccine producer by air. Upon their arrival at the Kathmandu airport, within 6-7 hours, are delivered to the National Vaccine Store at LMD, Teku Kathmandu. Only vaccines supplied through UNICEF are picked up by LMD, the rest of vaccine is responsibility of vaccine suppliers. LMD uses its own van for collecting vaccine from airport.

Transportation to the Sub-national (SN)

Central store is responsible for delivery of vaccines to 6 Regional Medical Stores every 3 months, based on vaccine planning and available stocks. Maximum time of transportation to the furthest RMS takes about 24 hours (~650 km). The refrigerated van is used to deliver the vaccines to the RMS.

Refrigerated “VAC” van

Currently there is one refrigerated van at central level. Which is 2009 year make. Now, one more refrigerated van is underway to procure. Refrigerated van at Teku is equipped with “Carrier” refrigeration unit. During run test it functioned properly, maintained a temperature of +2°C to +8°C. Vehicle and refrigeration units are both in good mechanical condition



Refrigerating unit powered by main engine and have a standby electrical power system that can be plugged into a mains supply. Teku equipped with necessary power adapter for refrigerated van. Vehicle equipped with in cab thermometer which can be read in the driver's cabin. Besides there is supply of log tag trix-8 is used to monitor temperature inside the van during transportation. which can produce hard copy output. Loading compartment characteristics given in the table below.

Table 9. “VAC” refrigerated compartment volume

Truck bed length 'L' (cm)	548	Gross volume (L)	19,330
Truck bed width 'W' (cm)	196	Net volume (L)	6,450
Truck body height 'H' (cm)	180		

Transportation to the Sub National Level (SN)

Regional Medical Stores based on the stock and consumption of the vaccines and consumables supplies monthly to the districts covered. For this purpose, ISR is used strictly. Now, six more refrigerated van is underway to procure for each SN to collect from PR and supply to LDs.

Transportation to the Lowest Distribution Level Stores LD

District stores responsible for vaccine collection from RMS and supply to service delivery points/health facility for each sessions. Currently there is provision to supply vaccines and consumables to 10 accessible districts from Central vaccines stores.

Transportation from LD to SP Level

Primary health care facilities receive vaccines from district stores by travelling to the district once per month. For vaccine transportation all of them are equipped with vaccine carriers and icepacks. Some of PHC use own transport and others use public transport means for delivering vaccines.

3.3 Recording and reporting systems

Logistics Management Information System (LMIS) is in place to record and report vaccine and logistics related information. At facility level reports are compiled every three months, district level reports are compiled every month and at central level every month and three months.

In 2015, Online Inventory Management System for cold chain equipment and vaccine was introduced with support from WHO, UNICEF/Nepal and Lifeline Nepal to address the issue of stock management systems and procedures pointed out by EVM Assessment Report 2014. Online IMS was adopted from web-based LMIS developed in 2008 encouraging Real Time Data as well as batch and expiry date wise information recording and reporting which minimizes the workload of the health workers and helps in updating stock reports and records. Adaptation of online inventory management system ensures accuracy and since the inventory is managed online, this also keeps the inventory records secured minimizing data loss. Online IMS Software was finalized in 2016. The system is resourcefully being implemented in Regional Medical Stores and Central store. DPHO Kathmandu and DPHO Bhaktapur is successfully implementing Online IMS system.

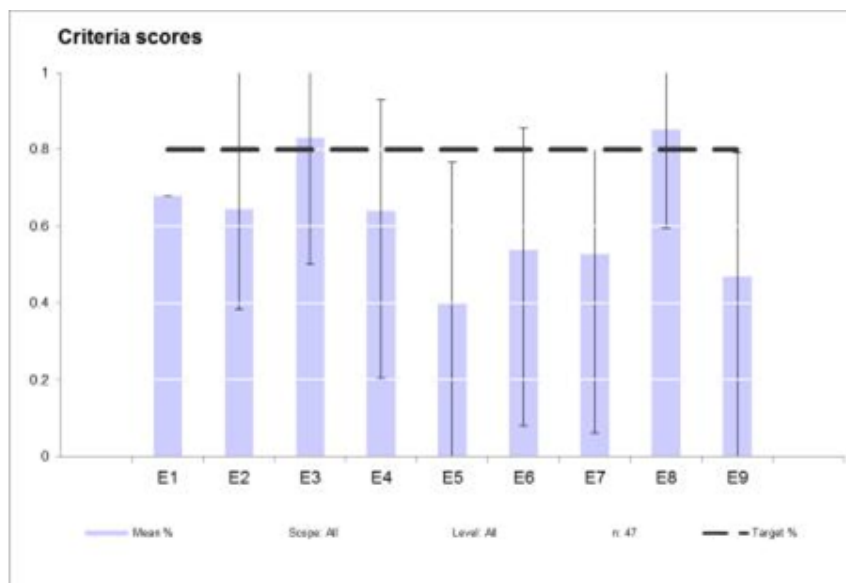
Data from all outreach sessions and static clinics are recorded and collected at grassroots level and are sent to health facilities every month. The health facilities compile and send reports to the district every month. The DHOs compile, analyse, and send coverage reports to the Health Management Information System and the RHD every month. Quarterly reviews of all immunization related data exist at district level. The DHO categorizes VDC data by coverage, drop-out rates and number of unimmunized children to identify high- and low-performing VDCs. At each level monthly coverage data are entered in an immunization monitoring chart which has to be filled every month and displayed for the use of health workers and community people for monthly monitoring purposes. Most of the statistical assistants, medical recorders, health assistants and EPI supervisors are trained for data quality self-assessments (DQSA) and many districts conduct DQSA routinely.

Country adopted WHO-UNICEF VAR form. Each vaccine store and HF providing immunization has standardized uniform ledgers. Lower levels provide requisition and issue vouchers for vaccines and immunization supplies. System uses issue vouchers for vaccines and immunization supplies. Temperature monitoring sheets are present to record readings manually but lacks like alarm event. Vaccination coverage is done on monthly basis from facility level to upper level used by standard form HMIS-6TT register, HMIS-5 Immunization register, HMIS-30 Tally Sheet and Reports 31, 32 and 33.

4. Previous assessment-EVM Assessment 2014

Nepal conducted EVM Assessment in 2008, 2011 and in 2014. The table below shows the scores obtain in previous assessment of 2014.

Figure 4: EVM Assessment scores 2014



4.1 Key assessment findings

EVM Assessment 2014 showed that majority of EVM criteria scored needed improvement to reach the 80% target level set by WHO-UNICEF for effective practices in all levels of vaccine supply chain in the Nepal. Criteria E2 (All vaccines and diluents are stored within WHO-recommended temperature ranges) at National level, E5 (Maintenance of buildings, cold chain equipment and vehicles is satisfactory).and E6 (Stock management systems and procedures are effective) at all levels needed special attention.

The strongest categories were Capacity and Training. The other categories required adjustments.

Table 10. Nepal category scores (by level) 2014

	E1	E2	E3	E4	E5	E6	E7	E8	E9
Primary store	68	47	82	55	72	67	59	79	46
Sub-national store		59	93	77	54	77	60	90	48
Lowest delivery level store		69	86	75	41	61	59	84	48
Service point		63	78	47	33	39	44	85	45
Average	68	60	85	64	50	61	56	85	47

4.2 Key recommendations

Key recommendations from EVM Assessment of 2014 are listed below

- Keep temperature records in a safe place for a minimum of three years.
- Carry out an internal review of the temperature records every month. There were written records of these reviews which identifies problems and records actions taken.
- Contingency plan designed to deal with foreseeable emergencies at each store.
- The quality of the vaccine store buildings must meet minimum requirements. Carry out necessary works at facilities needed: roof, wall, windows and external doors, floors, air conditioning, electrical, drainage and heating system repairs. Provide necessary fire extinguishers and test them annually.
- Equipment. Establish a planned preventive maintenance programme and provide evidence that this plan is being followed. Provide written planned preventive maintenance (PPM) programme and documentary evidence that the programme is being followed.
- Equipment: make arrangements to ensure that cold chain equipment is repaired within 7 days of breakdown. Record these repairs.
- All stores with generators (especially central and regional level) should have adequate fuel supply for at least 72 hours continuous running. If electrical supply stable, fuel volume for one hour running should be provided on the weekly basis to run generators checkup.
- Provide voltage regulators for all refrigeration equipment especially for cold rooms at regional medical stores. (In some locations cold rooms not functional due to lack of functional voltage regulators.
- Transport: Establish a routine maintenance and overhaul programme and provide evidence that this plan is being followed. Provide written planned overhaul programme and documentary evidence that the programme is being followed.
- National level to review stock control records to include required stock information. VVM status recorded at all levels at stock forms
- Maximum and safety stock levels should be reviewed and set according to the practical experience for each vaccine and for each consumable.
- Carry out a physical inventory of other consumables (AD syringes, safety boxes, consumables, spare parts, etc.) at least once every three months at primary level and at least equal to the supply frequency at lower levels.

- The programme to prepare routine reports on internal vaccine distributions, summarizing the details of each and every transaction
- Requisition and issue vouchers used for ordering and receiving vaccine and all sections completed
- Safely dispose of damaged or expired stock in accordance with standing orders. Damaged (expired) vaccine and syringes must be clearly labelled and stored outside the cold chain to prevent it being issued in error. All unusable products removed from stores without delays.
- Lost and adjustment form (form N50 and entry form) used to adjust stock records

4.3 Progress on recommendations

The following improvements have been made to follow the recommendations from the previous assessment:

Temperature Monitoring:

Temperature monitoring system was needed to be improved using the new technologies for temperature measuring, data communication technologies and procedures to minimize risk of damage to vaccines. The actions taken since the previous assessment are:

- Conducted the temperature mapping study for all cold rooms with good documentation to make sure that vaccines are correctly stored inside the rooms.
- Shifted to an event data logger system at the central and sub national store where cold / freezer rooms are used.
- Used continuous electronic temperature data loggers (30 days data logger) in some of the facilities to make sure that vaccines are stored at the proper recommended temperature the whole day even during weekends and official holidays.
- Used freeze monitoring devices with freeze sensitive vaccines during storage and transport.
- Have been encouraging the senior supervisor to monthly review the temperature recording forms for any out of range of temperature and sign and document the action taken at all levels.

Cold Chain Storage capacity, Building, Equipment and Transport

Whilst storage capacity would not appear to be major issue (performance was rated at approx. 70% in previous assessment), storage quality of the cold and dry storage are of a major concern. The improvement of CCE Storage capacity, building, equipment and transport was made by:

- Procurement of vaccine refrigerators is according to WHO/PQS compliant
- Ensured adequate dry store capacity at some of the lower levels.
- Developed and distributed detailed satisfactory contingency plan per level.

Maintenance

Improved the maintenance system by:

- Developed a comprehensive annual preventive maintenance plan for buildings and coldchain equipment.
- Routine maintenance was carried out regularly with well documentation at all levels.

Vaccine and Supply Stock Management

Improved the vaccine stock management system by:

- Updated, standardized and distributed stock log books to include all the required information about the vaccine and diluents (presentation, batch no., manufacture, expiry date, VVM...etc).
- Stock management and reporting forms were aligned with the wLMIS nationally to include all prerequisites input and reporting parameters with complete EPI needs inclusive of reports generated from the different WHO management tools.
- Enforced and strengthened the concept of vaccine stock level policy (maximum, minimum, re-order level) to minimize over stock or stock out events.
- Continued the manual system in parallel to the wLMIS.
- Encouraged by training the staffs nationwide to calculate their annual/ monthly needs of vaccines and safety injection equipment.

Distribution

Strengthened the distribution system by:

- Developed comprehensive distribution plan for all stores
- Established a uniform system for ordering, issuing and receiving vaccines and supplies between levels using standardized voucher (ISR form) including all the important information about the vaccine, diluents and the monitoring indicators (VVM and freeze indicator).

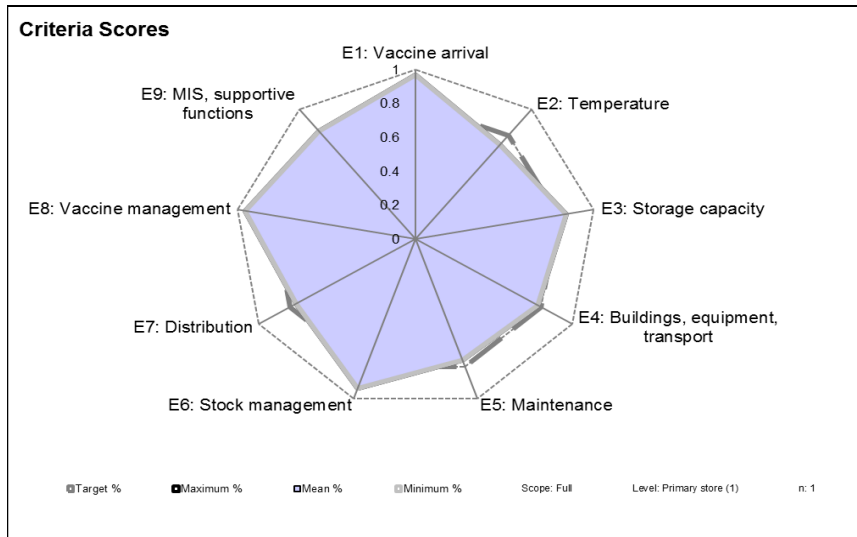
Supportive Functions and Information System

- Conducted training for 435 health workers all over Nepal on proper vaccine management practices and new practices related to temperature monitoring.
- Printed and pasted VVM and Shake Test Posters (WHO/PATH model) at all levels of the supply chain.

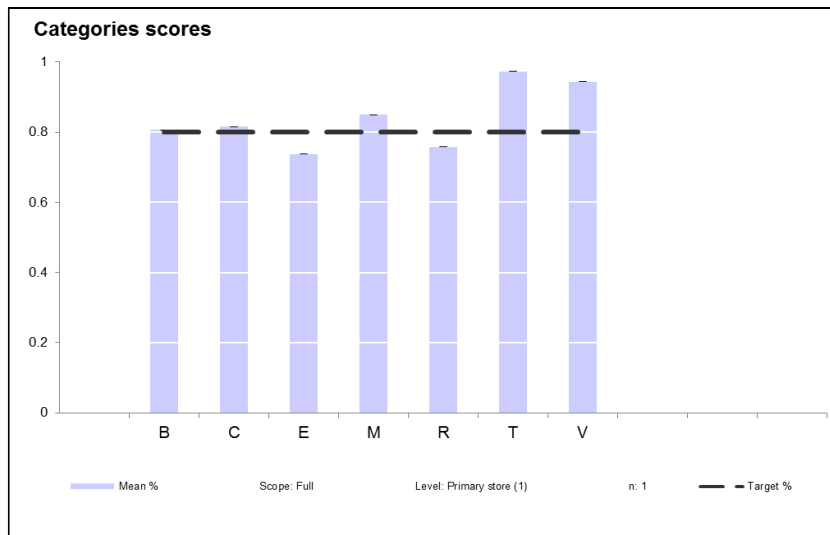
5. EVM Assessment 2017 findings by level

This section presents the assessment findings, the analysis of those findings, and the subsequent recommendations, on a level-by-level basis. Detailed recommendations, applicable to all levels, are presented in annex 1.

5.1 Primary level



The above spider chart shows all nine criteria scores are improved to above 70% in comparison to the previous assessment where only two out of nine criteria (E3 Storage Capacity and E8 Vaccine Management) scored near the 80% level set by WHO-UNICEF as a target for proper practices in vaccine store. Three out of nine criteria (E1 Vaccine Arrival, E6 Stock Management and E8 Vaccine management) have scored above 90% while two criteria (E3 Storage Capacity and E9 MIS, Supportive functions) have scored 85% and 83% respectively. Four criteria (E2 temperature E4 Building, equipment, transport E5 Maintenance and E7 Distribution) have scored above 70% and requires further improvement to achieve 80% score.



Legend: Buildings, Capacity, Equipment, Management, Repairs/maintenance, Training, Vehicles

In analysis of categories scores, five out of seven scores in applicable categories reached the required target (Building Capacity, Management Training and Vehicle).

E1: Vaccine arrival procedures

Criteria E1 is applicable only to the national vaccine store in Teku Kathmandu. This criteria deals with Pre-shipment and arrival procedures to ensure that every shipment from the vaccine manufacturer reaches to the receiving store in satisfactory condition and with correct paperwork. Second vaccine store in Pathlaiya receives vaccines from Teku and not directly from vaccine manufacturers, during review period no vaccines were stored in Pathlaiya.

With the score of 97%, overall compliance with this criterion is satisfactory.

Majority of vaccines for routine immunization are supplied to the primary store from international manufacturers by local private suppliers using government funds. DTP-HepB-Hib vaccines were procured using GAVI mechanism, via UNICEF

SD. OPV vaccines for campaigns were procured by UNICEF and JE procured by private supplier with use of governmental funds.

Country adopted VAR form after EVSM assessment in 2003 (EVM Assessment Report 2014) and PAR form in 2015. Local VAR form includes all key procedures from VAR Parts I to VII.

Forty-five individual vaccine arrivals were received during the review period. There were matching numbers of VARs accompanying each individual vaccine. The “Inspection Supervisor” completed all Forty-five VARs correctly. All VARs reported complete set of accompanying documentation.

Forty-five vaccine lots were received during the review period. Out of which eight were procured by Government of Nepal and thirty-seven vaccine lots were procured through UNICEF. All lots were accompanied with lot release certificate from the NRA (DDA) in the country of origin.

As recommended by WHO, Nepal also issues its own lot release certificate for vaccine lots procured by the



government. Therefore, eight lots were accompanied with lot release certificate issued by the country itself along with lot release certificate from country of origin.

The vaccines are transported in insulated shipping containers.

SOP is in place that define the working procedures at the time of arrival. The working arrangements with customs was found to be good despite lack of training to custom staffs regarding SOPs. Contingency plan was in place in case of unexpected arrival delays. However, no such delays occurred during the review period.

During review period, the immunization supplies received directly from international sources or via UN source.

Eight Product Arrival Report (PAR) were reported during the review period. Report includes all key procedures from Part I to Part VI.

E2: Temperature monitoring

E2 criteria ensures all vaccines and diluents are stored within WHO recommended temperature ranges. The score in this criteria has increased from 47% to 73%. Temperature monitoring study in accordance with WHO/IVB/05.01, was carried out in coordination with WHO. Data of the study has been collected and the report is being prepared.

Central store Teku, has seven cold rooms (5) and freezer rooms (2). One of the freezer rooms is being used as cold room for storage of vaccine between 2 to 8° C. Only the cold rooms have fully documented temperature mapping study. Due to unavailability of temperature monitoring device for the freezer room, temperature mapping study was not carried out for freezer room.

Well trained and well informed health workers and store keepers added the scores. Manual temperature records for each refrigeration equipment were safe and completed. The facility had also maintained the temperature logger print-outs for WIC, WIF and Refrigerated Vehicle. However, the print outs from WIC 6 Hurrey (converted from WIF to WIC for temporary purpose) did not agree with matching manual temperature records. Apart from the variation of temperature, vaccines are still in recommended temperature (2 to 8° C) (Sample date: April 19 to 26, 2016)

During the review period, Temperature records and alarm events were formally reviewed and documented in monthly basis.

There were no test calibration record for the WIC, WIF and refrigerated vehicle. Although, on-site calibration test was done during assessment at central store. The temperature from thermometer panel board, calibrated device (30 DTM) freeze tag and Multilog showed the reading to be within one degree threshold which is within a recommended range.

E3: Storage and transport capacity

E3 criteria ensures the cold storage, dry storage and transport capacity is sufficient to accommodate all vaccines and supplies for the NIP program.

The score of PR level is 85% in this assessment which is 3% higher than the assessment done in 2014. . Net storage capacity of +2°C to +8°C for central vaccine store Teku has been found to be not sufficient and same for -20°C vaccine storage.

There is not adequate storage for dry space of diluents, syringes and safety boxes. In terms of the, storage capacity for the refrigerated van for transportation is currently sufficient for national level.

SOP manual which sets out a contingency plan in the event of equipment failure or other emergency were found at PR at the time of assessment. Cold chain Staff were aware on the contingency plan during emergency

E4: Buildings, equipment and transport

E4 Criteria ensures buildings, cold chain equipment and transport system are in optimal condition for the vaccines and consumable to function well.

The assessment finds the E4 score at the central vaccine store at 78% in 2017 which is 23% increment from that of the 2014 assessment. The vaccine store was secured and was designed such that the delivery vehicle can reach loading area. The quality of vaccine store and dry store building meets the following minimum requirements.

- The vaccine store building was suitable for the climate;
- The roof was free of leaks;
- The external walls were free of severe cracks or other major damage;
- Windows and external doors were in good condition and secure (grilles and/or locks);
- Floors were dry and reasonably levelled;
- The fire extinguishers were periodically checked in terms of the expiry and functional status.
- The drainage system was working (both rainwater and foul drainage);

The layout of the space housing the refrigeration equipment was in-line with WHO recommendations with adequate space and ventilation. The following were the observations made during the assessment.

- The packing area was close to the refrigeration equipment area;
- The icepack freezers or chilled water pack coolers were close to the packing area;
- There was sufficient lay out space for conditioning icepacks (n/a if chilled water packs or eutectic panels are used, or if container design does not require conditioned icepacks);
- There was sufficient lay out space for packing vaccines into containers;
- There was sufficient space to store packed containers;
- There were no hands washing facilities in, or close to the packing area;
- The temperature of the packing area was not maintained between 15° and 25°C throughout the year;
- The packing area was protected against direct sunlight.

The assessment of the refrigerated vehicle showed following findings.

- The packing area was close to the refrigeration equipment area.
- The delivery cartons or delivery crates were stored in or close to the packing area.
- There was not sufficient lay out space to assemble vaccine orders for packing into delivery cartons or delivery crates.
- Packed vaccines could be loaded directly into the refrigerated vehicle.
- There were no hand washing facilities in, or close to the packing area.

- The temperature of the packing area could not be maintained between 15° and 25°C throughout the year.
- The packing area was protected against direct sunlight.

There was no enough storage space for diluents, packaging cartons or packaging crates, cold boxes and consumables in packing area.

The dry store had been organised with shelving and pallet standing. However, this was done manually and required mechanical handling equipment.

The store had a dedicated generator connected with all the equipment in the vaccine store with sufficient fuel supplies. The dedicated generator was within secured compound.

Voltage regulators was attached to all of the seven WICs and WIFs; and to three out of fourteen vaccine freezers and refrigerators. WICs and WIFs also had functioning continuous temperature monitoring equipment.

E5: Maintenance

E5 criteria assesses maintenance of building, cold chain equipment and vehicle as per standard. The E5 score in this assessment was found to be at 76% which is 4% higher than previous 2014 assessment.

The assessment finds the emergency repairs and replacements of the building was carried out effectively. A planned preventive maintenance program for equipment was present and the assessment team found that the plan has been followed. All of the seven cold rooms and freezer room in Primary Store were clean and defrosted at the time of assessment.

The store had one refrigerated vehicle for vaccine transport and collection. However, the service manual or service logbook of the maintenance was not maintained. Similarly, planned preventive maintenance program was also not in place for the transportation vehicle.

Two Mechanical engineers were assigned to carry out prompt repairs in the event of equipment breakdowns. At the time of inspection following findings were identified.

- All of the 7 cold rooms and freezer rooms were fully functional.
- Out of 11 vaccine refrigerators and freezers, 3 were temporarily switched off. But, all were fully functional.
- Out of 4 dedicated ice pack freezers, one was temporarily switched off. All were fully functional.

E6: Stock management

E6 criteria assesses stock management systems and procedures are effective as per standards.

The E6 score was at 94% during this assessment which was 27% higher than the previous assessment of 2014. One of the reasons for the increment was due to implementation of online Inventory Management System (IMS) software which assured standardized reporting and recording from the CVS immediately after receipt and dispatching of vaccines and devices.

Stock record had the following information of the vaccines:

- Type of vaccine
- Vaccine presentation (vial size)

- Quantity received in doses
- Vaccine manufacturer
- Manufacturing batch or lot number
- Expiry data of each vaccine batch
- VVM Status

Stock record of the diluents were also available with following information:

- Type of diluent
- Diluent presentation(vial size)
- Quantity received in doses
- Diluent manufacturer
- Manufacturing batch or lot number
- Expiry date of each batch

Vaccine requisition form was used for ordering vaccines. The store receives requisition form from regional medical stores and 10 districts. Vaccines were issued according to the 'earliest-expiry-first-out' (EEFO) principle and the storekeeper could make exception to the EEFO rule considering the VVM Status.

The Indent, Supply and Receipt (ISR) form has the following sections:

Dispatch: Issue vouchers were completed for all vaccines and consumables that leave the store. Quantities of outgoing stock were recorded in online stock records.

Arrival: It was ensured that all receiving store carried out arrival checks. The arrival sections of all issue vouchers were complete and the receiving store (RMS) returned the arrival section to the issuing store (Central Store).

Disposal: The store had not witnessed any wastage of unopened vials due to expiry, freezing or heat-exposure. However, the stock control system was designed to record vaccine and diluents wastage. Besides, it was identified that disposal facilities and procedures were not in accordance with WHO norms.

Physical inventories: During the review period, the physical counts of vaccine stocks carried out thrice as per the record. A system to carry out physical count in quarterly basis had been initiated since SOP suggested that physical count should be carried out at least 4 times a year.

The physical count of sample freeze sensitive vaccine BCG and its diluent matched with the stock record. The physical count of sample consumable, AD Syringe 0.05, matched with stock record.

Good Warehousing Practices: Vaccines were secured and laid out in EEFO order, by type and by lot number. Contents labels were fixed to all cold chain equipment indicating vaccine type, lot no. and expiry date. Dry goods were secured and stored correctly. Dry goods were laid out in an orderly fashion and in EEFO order.

E7: Distribution

E7 criteria assesses distribution between each level in the supply chain is effective as per standards. Comparing with the previous assessment conducted in 2014, the score had increased from 59% to 76%.

Distribution plan was present in the store which indicated a formally communicated vaccine distribution system was in place. During the review period, the assessment team found no system to review the discrepancy in planned versus actual vaccine distribution.

Vaccines were correctly packed for transport as per the following findings:

- Refrigerated vehicle was pre-cooled before loading
- SOP manual was present which showed how the vehicle should be packed
- Packing was carried out in accordance with the SOP

Freeze indicators were not used in all the deliveries, packed with freeze-sensitive vaccines.

There was a requisition and issue voucher system and included all necessary information. Out of the sampled 14 issue vouchers, it was found that 12 arrival sections were returned with record of VVM status.

There was no written transport contingency plan which described how to deal with emergencies during distribution. Since a member from Cold chain section always accompanied the driver during transport, they know what to do in the event of emergency. Driver had a mobile phone to contact the store during transit.

E8: Vaccine management

E8 criteria assesses that appropriate vaccine management policies are adopted and implemented. The score in this criteria was 96% which is an increment by 17% from the previous assessment.

The storekeeper was aware when and how to conduct shake test. There were no events, for last 12 months, that required a shake test though. The VVM poster was available and storekeeper was aware how to read VVM. Store keeper could also explain main types of unopened vial wastage and explain how the wastage rate is calculated. For national level waste management, waste management assessment had not been carried out.

Eg: MIS and supportive functions

Eg criteria assesses that the information system and supportive management function are satisfactory. The score for this criteria was 83% which was an increment by 37% from that of 2014 assessment.

EVM Standard Operating Procedure (SOP) manual was available to provide guidance for national procedures and the national supply chain system. The EVM SOP was up-to-date and was accessible to workers in the cold chain section and the staff members have received training on EVM SOP.

Vaccine and syringe forecasting: The standard method used to estimate annual vaccine and syringe requirement was based on the following information:

- Projected target population provided by Central Bureau of Statistics
- Annual vaccine wastage report produced by Department of Health Service
- Annual vaccination coverage by district, region and national level

Cold chain inventory was not frequently updated.

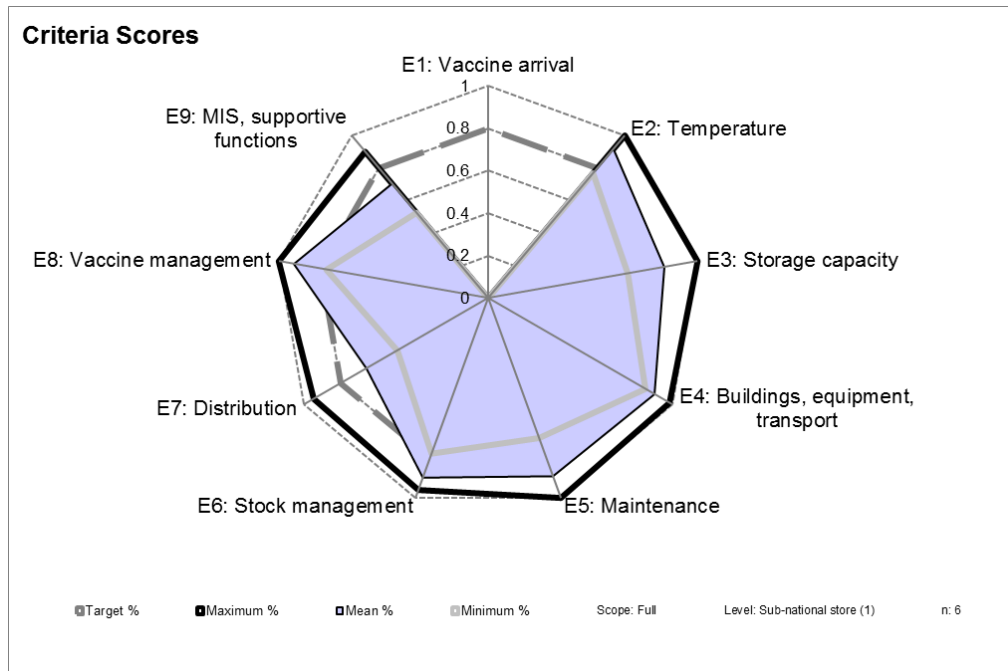
Annual Workplan and Budget was available for:

- Cold chain Equipment
- Vehicle

- Maintenance Issues
- Staff resources
- Staff Training.

No dedicated budget was allocated for Healthcare waste management. None of the services such as custom clearance, storage services, transport services and equipment maintenance services were outsourced.

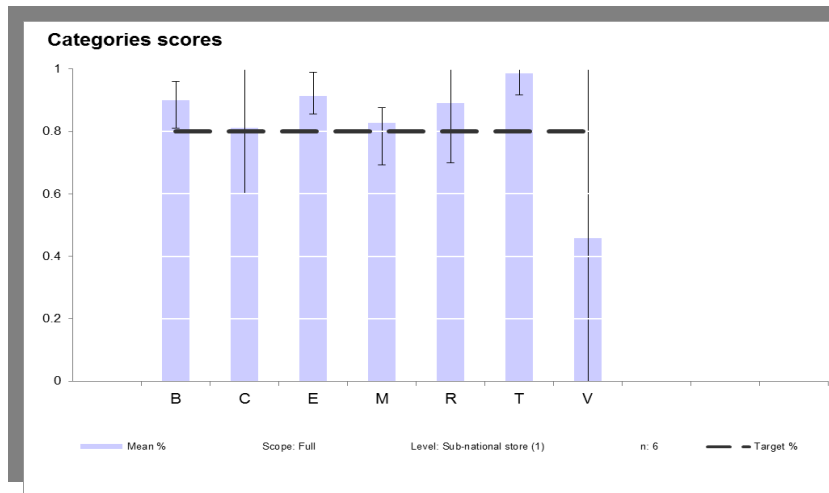
5.2 Sub-national level



In the analysis of EVM criteria, sub-national level stores have achieved more than the required target of 80% in six out of eight criteria. The following are the criteria that scored the score of more than 90%:

- E2: Systematic and routine temperature monitoring
- E4: Well-functioning and maintained cold chain equipment, building condition and transportation
- E6: Effective management of stock records
- E8: Implementation and adoption of vaccine management policies

E5 Maintenance scored 89% and E3 criteria (Storage capacity) scored above 80%. However, score for criteria E3 decreased from 93% to 84% compared to the previous assessment of 2014. The two criteria that scored below 80% (E7 Distribution and E9 MIS, supportive functions) need additional effort and attention.



Legend: Buildings, Capacity, Equipment, Management, Repairs/maintenance, Training, Vehicles

In analysis by categories, six scores out of seven assessed categories exceeded required target, while the seventh category (Vehicle) achieve only 46% score.

E2: Temperature monitoring

The score for this criteria was 92% which was an increment of 33% from the previous 2014 assessment. This was because of regular temperature monitoring and proper documentation in most of the sub-national stores. The EVM SOP training enhanced the knowledge of the storekeepers.

The limitations to this criteria was that, the score lacked in context of the temperature mapping of the cold room as all of those rooms did not have complete set of documented study. The calibration test and its record were not kept for almost half of the stores.

E3: Storage and transport capacity

The score for this criteria was 82% which was a decrement of 9% from the previous 2014 assessment. The reason was inadequate storage capacity of vaccine transport vehicles. The overall storage capacity of refrigerators, freezers and dry store was sufficient. The capacity of the ice pack freezers was found to be low. The supply system of Nepal requires the Lowest Distribution Centers (district vaccine stores) to collect the vaccines from the Sub-national Store. Due to this reason, the cold boxes and passive containers are not in adequate number in SNs.

E4: Buildings, equipment and transport

The score for this criteria was 90% which was an increment of 13% from the previous 2014 assessment. The increment was due to sufficiency of dry store, warm clothes, and standby generators. To sum up, it was also because of the well-maintained store with packing and loading bay. The loading/packing bay

is in accessible area from the cold chain equipment and dry store. The temperature in the packing bay could not be maintained between 15 to 25°C throughout the year. There was lack of drainage in some of the stores.

E5: Maintenance

The score for this criteria was 89% which was an increment of 35% from the previous 2014 assessment. The practice of planned preventive maintenance checklist provided better maintenance of CCE and building. It was found that they had regular maintenance and documentation. Instead of the refrigerated vehicles, the sub-national stores operated on the normal trucks for the delivery of vaccine.

E6: Stock management

The score for this criteria was 90% which was an increment of 13% from the previous 2014 assessment. The assessment found implementation of online vaccine inventory system to standardize recording and reporting of the required information on receipt and distribution. The requisition form and issue vouchers had been maintained. The arrival vouchers were not maintained properly. The stock records and stock in hand showed the vaccines were stored as per EEFO rule. The stock control system was not designed to record diluent wastage in unopened vials. Most of the stores did not have internal review system to review the reasons for vaccine loss or damage. In some of the stores, the physical count of the vaccines and diluents did not match with the stock book records.

E7: Distribution

The score for this criteria was 66% which was an increment of 6% from the previous 2014 assessment. Distribution plan was present in the store which indicated a formally communicated vaccine distribution system was in place. During the review period, the assessment team found no system to review the discrepancy in planned versus actual vaccine distribution. Standard ice pack conditioning was followed and the freeze indicators were used during vaccine transport by the sub-national stores. The records of short shipments to receiving stores are not properly managed. The recording of VVM was present in the issuing voucher provided by this level but not in the arrival vouchers by the LDs.

E8: Vaccine management

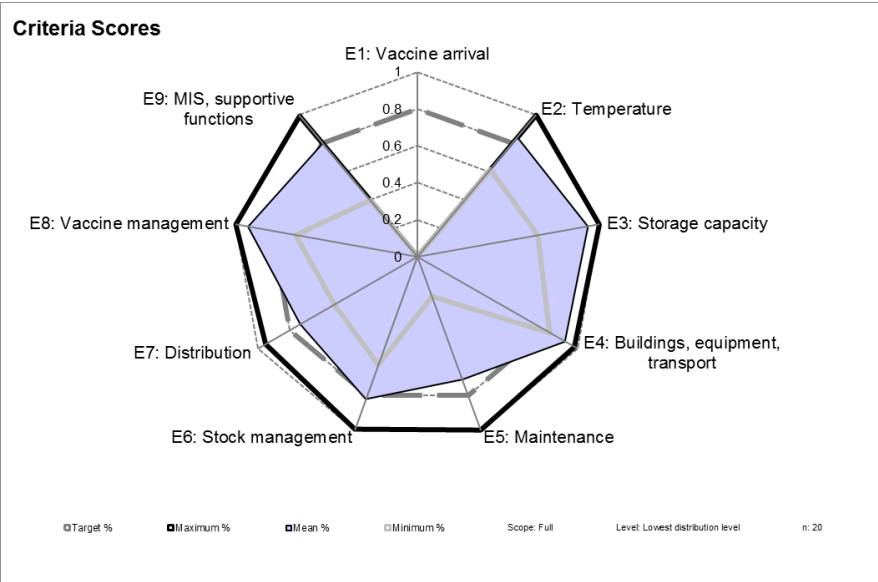
The score for this criteria was 93% which was an increment of 3% from the previous 2014 assessment. The storekeepers were aware on the use of shake test and VVM. The SOP training has enhanced the skill of the staffs to read, record and report the VVM status. The vaccine wastage monitoring system was not used by the sub-national stores.

E9: MIS and supportive functions

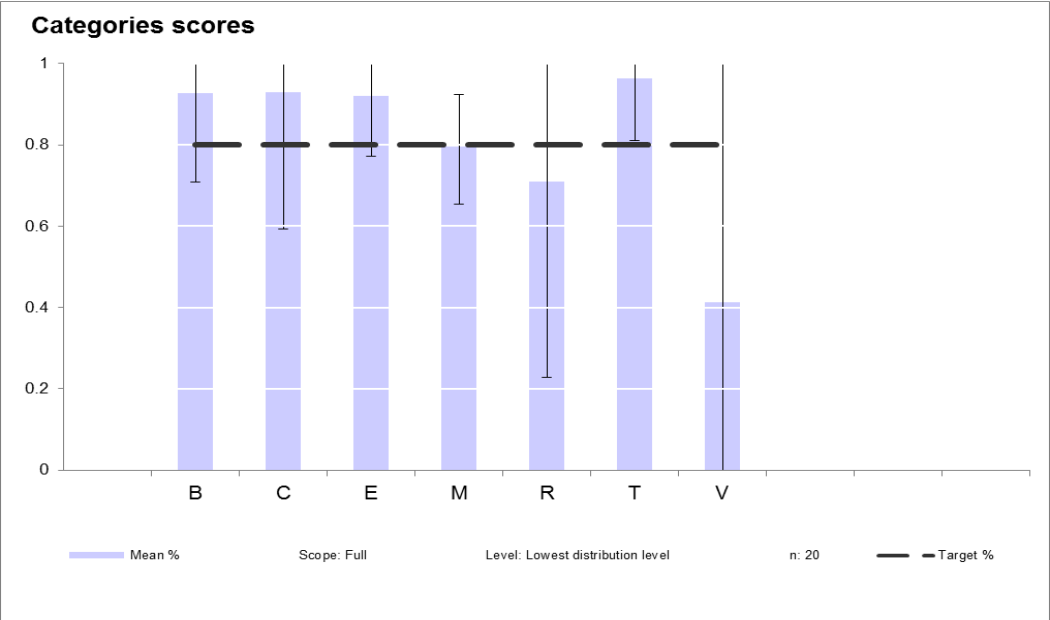
The score for this criteria was 70% which was an increment of 22% from the previous 2014 assessment.

The assessment found the EVM SOP training being provided to all the staffs, availability of vaccine forecast document, annual work plan and budget with appropriate staffing. The annual work plan and budget allocated does not seem to be sufficient for health care waste management. A regular supportive supervision was reported however, no records were found.

5.3 Lowest delivery level



The assessment for the LD showed the criteria score of lowest distribution level stores. The result was the average of score obtained by twenty stores which were assessed in this assessment. All of the criteria obtained above 70% scores out of which two criteria - E5 Maintenance and E7 Distribution obtained 71% and 74% respectively. Similarly, remaining six achieved the 80% level set by WHO-UNICEF as a target for proper practices in vaccine store.



Legend: Buildings, Capacity, Equipment, Management, Repairs/maintenance, Training, Vehicles

In analysis by categories, five scores out of seven assessed categories achieved required target, while the category Repairs/ Maintenance has obtained 71%, the category Vehicle has achieved only 41 % score.

E2: Temperature monitoring

The score for this criteria was 84% which was an increment of 15% from the previous 2014 assessment. The storekeepers at LD level were aware of correct storage temperature range for each of the vaccine on the schedule.

Health workers in 18 out of 20 district stores could demonstrate correct reading of temperature recording device and thermometer in the store.

The manual temperature records were maintained for each and every refrigerators twice daily everyday through out the review period. Only 9 out of 20 LDs had temperature record form which include space for entering alarm event.

The temperature records were safely kept for at least three years in 18 LDs. The standard practice to conduct monthly review of temperature records was done in 30% of the LDs.

E3: Storage and transport capacity

The score for this criteria was 94% which was an increment of 9% from the previous 2014 assessment.

The assessment found that cold storage, dry storage and transport capacity to accommodate all vaccines and consumables was satisfactory as per standards.

Conditioned ice packs were used in all LDs for vaccine transportation and there was sufficient storage capacity to meet maximum daily demand for ice packs. Passive containers capacity was sufficient to meet maximum daily demand.

There were contingency plan in all LDs to protect the vaccines in an emergency.

E4: Buildings, equipment and transport

The score for this criteria was 92% which was an increment of 17% from the previous 2014 assessment.

The assessment found that all the site in district level where the vaccine store building is accessible to staff and to transport and is secure.

The quality of the vaccine store buildings met following minimum requirements:

- All the assessed vaccine store building were suitable for the climate
- The roof finish were in good condition and with no internal evidence of leaks.
- In 90% of LD, the extremal walls were free of severe cracks and other major damage.
- Windows and external doors were in good condition and secure with grills and locks.
- Floors were dry and reasonably leveled in more than 90% of LDs.
- Fire extinguishers were not present in only 60% of LDs.
- Electrical system was as per standard in all LDs.
- More than 60% LDs had working drainage system.

Ninety-five percent of LDs had the storekeeper's office close to the vaccine storage area and the room was large as per WHO recommendation.

Freezers and refrigerator comply with WHO Standards which were

- Vaccine freezers and refrigerators comply with WHO specifications
- Ice-lined refrigerators fitted with correct vaccine storage basket

Ninety percent LDs had CFC free refrigerators. 95% assessed LDs had generators installed. Generator was in working order in 90% LDs where generators were installed, 70% did not have auto-start system, generator could start all the connected equipment in only 65%, 75% have sufficient reserve supplies of fuel and generator was in a secure compound in 85% LDs.

Out of 70% LDs with severe voltage fluctuation, 40% of them had functioning voltage regulator attached and 30% LDs were not provided with voltage regulators for all refrigeration equipment.

Vaccine refrigerators in all the LDs had working continuous temperature recorders (daily temperature monitoring devices) and 85% LDs had a working thermometer stored with the vaccine in refrigerators.

Telecommunication connection was adequate as per standard for all the LDs and were in working order.

The office vehicle were used by 45% LDs for vaccine transportation, which were in good mechanical condition, maintained user logbook and up to date maintenance. Out of these vehicles, 35% had sufficient fuel storage. Passive containers complying WHO recommendations were kept in 90% LDs.

E5: Maintenance

The score for this criteria was 71% which was an increment of 30% from the previous 2014 assessment.

Eighty percent LDs had Written Planned Preventive Maintenance (PPM) program for building. However, 50% had followed the PPM.

For the cold chain equipment, 85% LDs had Written Planned Preventive Maintenance (PPM) program. However, 60% had followed the PPM.

The assessment showed that refrigerators and freezers in 75% LD stores were clean and defrosted.

The service manual or service logbook of the maintenance of vaccine transport vehicle was maintained in only 15% LDs. Similarly, PPM program is also not in place in 7 out of 9 stores for vehicle. At the time of inspection, following findings were identified:

- The proportion of LDs with fully functional vaccine refrigerators was 60%.
- 55% of LDs had dedicated ice pack freezers fully functional at the time of inspection.

E6: Stock management

The score for this criteria was 82% which was an increment of 21% from the previous 2014 assessment.

Thirty-five percent LD stores used computerized stock control system connected to printers with and the remaining had only manual stock system in use. Stock records were printed out and filed in monthly basis for permanent record keeping in the LDs with computerized stock control system.

All vaccine arrivals and vaccine dispatches were recorded and stock balances were updated within one working day of the transaction in 55% LDs.

Stock records maintained the following information for vaccine:

- Type of vaccine, vaccine presentation (vial size) and quantity received in doses in all LDs
- Vaccine manufacturer in 75% LDs
- Manufacturing batch or lot number in 85% LDs.
- Expiry data of each vaccine batch in 90% LDs
- VVM Status in 85% LDs.

Stock record maintained the following information for diluents:

- Type of diluent, diluent presentation (vial size), quantity received in doses in all LDs.
- Diluent manufacturer in 80% LDs.
- Manufacturing batch or lot number and expiry date of each batch in 90% LDs

Vaccine requisition forms were used for ordering vaccine in LDs. Vaccines were issued according to the 'earliest-expiry-first-out' (EEFO) Principle and the storekeeper could make exception to the EEFO rule considering the VVM Status.

The Indent, Supply and Receipt (ISR) form has the following sections:

Dispatch: Issue vouchers were completed for all vaccines and consumables.

Arrival: 55% LDs had the arrival sections of issue vouchers completed.

Disposal: It was identified that in 85% LDs, the stock control system was designed to record vaccine and diluents wastage. And out of these, record in only 70% LDs showed that this system was being used. Besides, it was identified that disposal facilities and procedures were not in accordance with WHO standards in 20% LDs. Internal reviews of the vaccine loss/damage records was carried out in 55% stores.

Stock of vaccines and consumables: Maximum stock level, reorder level and a safety stock level were established for each vaccine and consumables. The assessment found that in 55% LDs, annual vaccine supplies were sufficient to meet forecasted demand.

Physical inventories: A physical inventory of vaccine, diluent and dropper stocks was carried out equally to the planned supply frequency in all LDs.

The physical count of sample, freeze dried vaccine (BCG) and its diluent matched with the stock record in 30% and consumable, AD Syringe 0.05, matched with stock record in 25% LDs

Good warehousing Practices: In Seventy Five Percent LDs, vaccines and Dry goods were secured and laid out in EEFO order, by type and by lot number. Contents labels are fixed to all cold chain equipment indicating vaccine type, lot no. and expiry date. The store is clean and dry. Records are kept secured in 85% LDs.

E7: Distribution

The score for this criteria was 74% which was an increment of 15% from the previous 2014 assessment.

Distribution plan was present in all LDs. During the review period, there was no reporting system which could monitor actual vaccine distributions and compare with planned distributions in 95% LDs.

Thirty Five percent LDs showed records of short shipments issued during the review period, out of which 70% (5 stores) LDs corrected the short shipment before the arrival of next delivery.

Vaccines were correctly packed for transportation.

- All LDs carried-out ice pack conditioning accordance with WHO guidelines.
- Packing was carried out in accordance with the SOP or appliance labelling.

Freeze indicators were used by 20% LDs in the deliveries packed with freeze-sensitive vaccines.

Only 55% LDs had the practice of returning the arrival voucher and recording VVM. And the transport contingency plan was not in practice. However, a member from Cold chain section accompanied the driver during transportation for the emergency cases.

E8: Vaccine management

The score for this criteria was 93% which was an increment of 9% from the previous 2014 assessment.

The assessment found that storekeepers in all LDs were aware about shake test. However, there were no events in 65% LDs for last 12 months that required a shake test. 10% LDs carried out shake test and remaining 25% LDs did not carry out shake test for the event.

The VVM poster was available in 95% LDs and storekeepers were aware on reading VVMs in all LDs. However, storekeepers in 95% LDs used VVM status for vaccine management purposes.

Regarding wastage calculation following information were obtained:

- Store keepers in 95% LDs were aware of types of unopened vial wastage and could explain about wastage rate calculation.
- Wastage rate data for the review period that could be used for calculating wastage rate was available in 60% LDs.

Eg: MIS and supportive functions

The score for this criteria was 80% which was an increment of 32% from the previous 2014 assessment.

All LDs have Standard Operating Procedure (SOP) manual, written specifically in the context of national procedures and the national supply chain system.

The EVM SOP was up-to-date and was accessible to workers in the cold chain section and was available in 95% LDs. 90% LDs had staff members trained with EVM SOP.

Vaccine requirement forecasting: LDs used standard method to estimate annual vaccine requirement and used evidence-based target population, wastage rate and coverage data. The following are the findings of the assessment:

- Only 90% LDs used evidence-based target population
- 15% LDs did not use vaccine wastage rate, and
- Only 80% LDs used coverage data

Safe injection equipment requirement: Standard method was used to estimate annual need for syringes and safety boxes. Safe injection equipment requirement was forecasted using following information:

- Evidence-based target population data in 95% stores.
- Evidence-based coverage/previous consumption data in 90% stores.

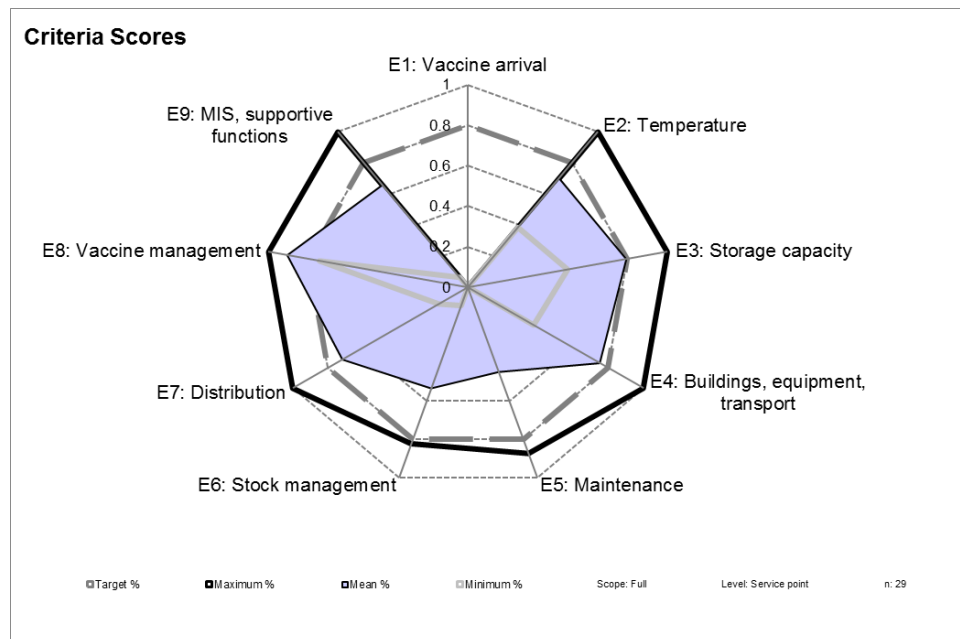
The assessment showed that cold chain inventory was not frequently updated. Budget Plan existed for the review period covering following topics:

- Cold Chain equipment in 90% LDs
- Vehicles in 60% LDs
- Health care waste management in 25% LDs
- Maintenance issues in all LDs
- Staff resource in 65% LDs
- Staff training in 60% LDs

Storekeeper/ Health workers in 95% LDs received vaccine management training during the review period. The records of training was found in 90% LDs.

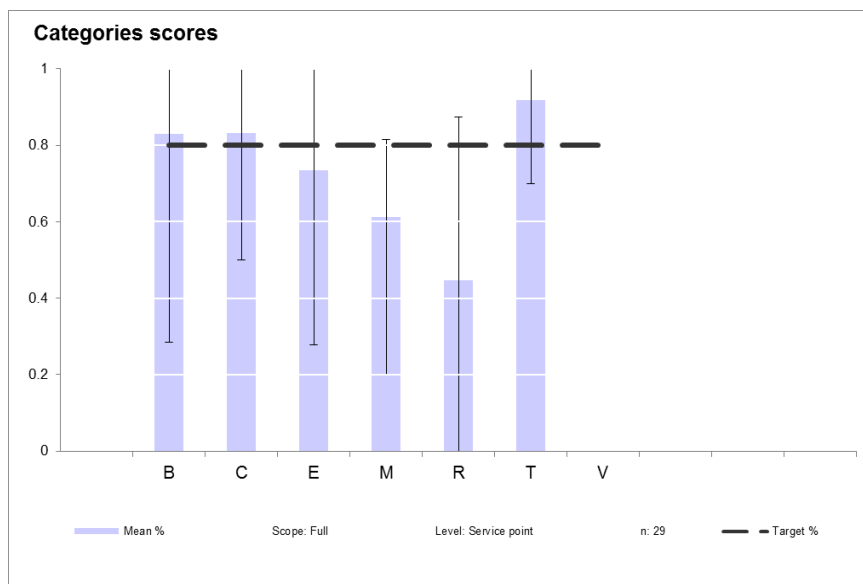
Supportive supervision during the review period was carried out in 65% LDs with number of visits varying from 1 to 10 times. However, there were records of the visits in 60% of these LDs.

5.4 Service delivery level



Twenty-nine service points were randomly selected for the assessment. Out of eight criteria applicable to service point (SP) level, the following were the findings:

- E8: Vaccine management achieved above 90%
- E2: Temperature, E3: Storage capacity, E4: Building, Equipment Transport and E7: Distribution obtained score of above 70%
- Other criteria relevant to service point need improvement to reach 80%
- E5 Maintenance scored 45%
- E6 (Stock management) and E9 (MIS and Supportive functions) with scores below 70%



Legend: Buildings, Capacity, Equipment, Management, Repairs/maintenance, Training, Vehicles

In analysis by categories, average scores in three out of six (Building, Capacity and Training) applicable categories exceeded required target. Category Repairs/Maintenance scored 45% and the category Vehicle did not get any score as it is not applicable in the SPs in the context of Nepal.

E2: Temperature monitoring

The score for this criteria was 70% which was an increment of 7% from the previous 2014 assessment. Storekeepers from all of the SPs could give the correct temperature range for each vaccine and storekeepers from 7% SPs could not identify the vaccines that are damaged by the temperature below 0°C. Similarly, storekeepers from 70% of SPs could demonstrate the correct thermometer reading. Temperature was recorded manually in 59% SPs and only 10% SP had the space for recording alarm events on the temperature recording form. Temperature records had been kept safely as per WHO standard at only 17% SPs and 31% SPs had conducted review on temperature record.

E3: Storage and transport capacity

The score for this criteria was 80% which was an increment of 2% from the previous 2014 assessment. The storage capacity of CCE and dry store was not found to be as good in the higher level. Seventy-six percent of the SPs had adequate storage capacity for refrigeration equipment. 58% of SPs had adequate number of icepacks, 13% had satisfactory number of icepacks (scored nearer to the highest value 5) and the remaining did not have sufficient icepacks in the store. Cool packs are not used in Nepal for vaccine transportation. 96% SPs had adequate coldbox storage capacity. Forty-one percent of the SPs had contingency plans posted inside the facility with emergency contact details. However, storekeepers from 72% SPs were aware on the actions to be taken during emergency situations.

E4: Buildings, equipment and transport

The score for this criteria was 75% which was an increment of 28% from the previous 2014 assessment. The assessment shows that the quality of vaccine store buildings meet the minimum requirements. All SPs were suitable for climate, 89% SPs had good roof condition with no internal evidence of leaks and external walls free of severe cracks. 96% SPs had good security with windows and external doors good in condition and 75% SPs had satisfactory electrical and drainage system as per WHO standard. Only 7% of the SPs had fire extinguisher and they have not been tested for the last 12 months from the assessment date.

Thirty-four percent SPs were equipped with vaccine freezers and 65% SPs were equipped with refrigerators that comply with the WHO specifications. 48% SPs had refrigeration units and 37% of had Ice-line refrigerators. Only 10% had the standby generators installed and they were not in auto start system. 27% SPs had severe voltage fluctuation and 31% SPs did not have voltage fluctuation. 37% of SPs had complete set of continuous temperature recorders placed in all of the equipment and only 34% SPs had working thermometers. 82% SPs had adequate telecommunication links and all of the SPs had passive containers complying WHO specifications.

E5: Maintenance

The score for this criteria was 45% which was an increment of 12% from the previous 2014 assessment. The assessments shows that the PPM program for building was followed in 17% SPs and for CCE the plan was followed in 6% SPs. It was found that the task of maintenance was generally assigned to the supporting staff. 62% SPs had clean and defrosted equipment.

E6: Stock management

The score for this criteria was 53% which was an increment of 14% from the previous 2014 assessment. 48% SPs were found to record the stock transactions by the end of the day. Only 50% SPs recorded incoming vaccines, diluents and other consumables accurately. Vaccine requisition forms were used in 96% SPs and advance notification for requisition is provided by 79%. The storekeepers of 89% SPs could make exception to the EEFO rule. Storekeepers of 65% SPs knew the standards of managing expired and damaged vaccine, only 20% SPs used stock control system that was designated to record vaccine and diluent wastage in unopened vials. The disposal procedure was in accordance to WHO national norms in 82% SPs and only 13% SPs kept records of discarded vaccines for the previous 3 years and carried out internal review of vaccine loss or damage twice a year. More than 50% SPs had set the maximum stock level, reorder level and safety stock level for each vaccine and for each consumables and kept the stock within the range of minimum and maximum stock level.

All vaccines, diluents and droppers were stored securely and correctly in 72% SPs. The contents were labelled on the cold chain equipment indicating vaccine type, lot no. and expiry date in 31% SPs. Vaccines were found laid out in EEFO order in 75% SPs. 75% SPs were found to be clean as mentioned by the assessment checklist. The dry goods had been correctly stored in 82% SPs and in EEFO order.

E7: Distribution

The score for this criteria was 72% which was an increment of 28% from the previous 2014 assessment. The assessment showed that vaccine distribution was formally communicated and freeze indicators were used during vaccine transporting.

Eighty-six percent of SPs carried out ice pack conditioning and packing of vaccines in accordance with WHO guideline. Forty-four percent of SPs used freeze indicators during transportation of vaccine. 86% SPs had written outreach programmes.

E8: Vaccine management

The score for this criteria was 91% which was an increment of 6% from the previous 2014 assessment.

Storekeepers of 65% SPs were aware on conducting shake test but none of them had done it in the past 12 months of assessment. The assessment showed that all of them used correct diluent to reconstitute freeze-dried vaccines, always kept diluents in refrigerator before and during every immunization session. Opened vials of freeze dried vaccines were discarded at the end of the session.

Written form of VVM instructions were posted in 79% SPs and all storekeepers were had knowledge on reading VVMs. 10% SPs had vaccines beyond VVM discard point during assessment. Multi Dose Vial Policy (MDVP) had been adopted by 82% SPs and health workers of 79% SPs could explain about MDVP.

Seventy-two percent SPs had vaccine wastage data at the facility. In 89% SPs, storekeepers could explain the types of opened and unopened vial wastage and 79% of them could explain about the method for calculating wastage rate. It was also found that 93% SPs used safety-box to dispose the used syringes.

Eg: MIS and supportive functions

The score for this criteria was 63% which was an increment of 18% from the previous 2014 assessment.

Storekeepers of 82% SPs had received vaccine management training during the review period. 48% SPs received supervisory visits during the review period.

Summary of findings

Temperature Monitoring

- Temperature monitoring study has been conducted recently by WHO and report is awaiting (The country is still practicing conditioned ice pack policy and the Inter-agency Coordination Committee and National Committee for Immunization Practices are still exploring for cool water pack policy which will take 2-3 years more to implement)
- Temperature mapping have not been conducted for all the cold rooms particularly in sub-national stores in the country
- The calibration test and its record were not kept for almost half of the sub-national stores
- The manual temperature recording forms used were not designed to record any alarm event and not reviewed and signed regularly by senior supervisor
- Temperature records are not analysed to undertake corrective actions at districts and service points
- Continuous temperature monitoring devices (30 DTRs) are not used for recording the temperature at any of the service points

Storage & transport capacities

- Net storage capacity at +20C to +80C for central vaccine store, one regional vaccine store is not sufficient for vaccine storage
- Storage capacity for refrigerated van is still not sufficient for national level
- Sub-national level stores are lacking adequate cold boxes for transportation of vaccine
- The use of the electronic freeze indicators are sub-optimal while transporting vaccines from district to service points and to the outreach sessions

Other key findings

- Reporting on preventive and corrective maintenance is a major weakness all sub-national levels
- Preventive maintenance is not regular at service points and the equipment breakdown rate is still high
- The cold chain technicians at regional level and district level are not trained on corrective maintenance
- Voltage regulators were not available for majority of equipment at districts and service points
- Supply of spare parts are not adequate
- No written preventive maintenance plan/program for the building, vehicles and cold chain equipment

6. General Recommendations

Based on the assessment of the effective vaccine management at different tier of immunization supply chain, there has been a number of key observations noted. Improvement in different categories will facilitate to improve the scores. However, these observations and recommendations needs to be translated into a budgeted action plan and should be part of annual work plan and budget for different levels.

- For Primary Store, the practice of using Product Arrival Reporting (PAR) needs to be strengthened.
- A MoU or letter of exchange between MoH and MoF for duty exemption, timeliness and working procedures with custom clearance for vaccine and its supplies.
- Carry out an internal review of the temperature records every month. There must be a written record of these reviews which identifies problems and records actions taken.
- Expand the storage capacity to accommodate maximum stock levels of routine vaccines and related consumables.
- Procure and supply refrigerator vans and vehicles for distribution of vaccines and supplies.
- Warehousing practices must be as per WHO guideline.
- Develop a mechanism to monitor implementation of maintenance and repair plan at all levels.
- Ensure all vaccine stores have adequate resources to have fuel supplies for generator for at least 72 hours.
- Ensure provision of voltage regulators for each refrigeration equipment.
- Maximum stock level and safety stock level should be reviewed and set as per standards to ensure adequate availability of vaccine and supplies at each level.
- Carry out a physical inventory of other consumables (AD syringes, safety boxes, consumables, spare parts, etc.) at least once every three months at primary level and at least equal to the supply frequency at lower levels.
- Receiving store should complete receipt section of requisition and issue vouchers used for ordering and receiving vaccine. And issuing store should make sure that all sections are recorded in stock entry.
- Implementation of Online Inventory Management System needs to be expanded to lowest distribution level.
- Safely dispose of damaged or expired vaccine and supplies should be in accordance with standing orders. Damaged or expired vaccine and syringes must be clearly labelled, recorded and stored outside the vaccine store for disposal.
- A system to prepare routine reports on internal vaccine distributions, summarizing the details of each and every transaction.
- A system should be developed to compare the forecasted and actual distribution plan.
- Lost and adjustment form (AGF form number 50) should be used to adjust stock records.
- Regular supportive supervision should be provided. And this should be documented and kept safely for evidence and future reference by the visited store.
- Provide the periodic basic and refresher training for capacity enhancement.
- Update accurate cold chain equipment and vehicle inventories regularly.

7. Detailed recommendations

Table 11. Recommendation by level and criteria

No.	Levels	Criterion	Recommendation
1	PR	E1	<p>Product Arrival Procedure (PAR) should be in practice as mentioned in SOP.</p> <p>There should be a contingency plan at customs.</p> <p>A MoU or letter of exchange between MoH and MoF for duty exemption, timeliness and working procedures with custom clearance for vaccine and its supplies.</p> <p>Customs staff should be oriented.</p>
2	PR, SN, LD, SP	E2	<p>Temperature record form with section to record alarm event should be brought into practice.</p> <p>Recorded alarm events should be formally reviewed at least once a month using Monthly Review Report/ Form.</p>
3	LD, SN	E3	<p>Storage capacity of vaccine storage refrigerators, dry store and delivery vehicle should be expanded on the basis of estimated maximum vaccine</p>
4	PR, SN, LD, SP	E4	<p>Construction of Central warehouse as per standard for vaccine and consumables storage</p> <p>Need refrigerated vehicles for transport of vaccine from regional store to district stores</p> <p>Facility should provide adequate Telecommunication links for effective communication and information sharing.</p>
5	PR, SN, LD, SP.	E5	<ol style="list-style-type: none"> Country should develop repair and maintenance plan. <ul style="list-style-type: none"> Need written PPM (Planned Preventive Maintenance) for Building, Refrigeration Equipment and Transport. The maintenance should be documented as per the PPM checklist Responsible personnel (as stated in SOP) should be assigned to carry out routine maintenance. CCE should be regularly clean and defrosted as guided by SOP. Corrective Maintenance: Repair should take place within 7 days to 4 weeks of the failure. Vehicle should be serviced in accordance with manufacturer's service manual.
6	LD, SP	E6	<p>All vaccine arrivals and dispatches should be recorded and stock</p>

No.	Levels	Criterion	Recommendation
			<p>balances should be updated within one working day of transaction. This should also be applied for online inventory system for vaccine management.</p> <p>Receiving store should complete Arrival voucher for every delivery.</p> <p>Physical Count should be carried out at least once a month and should be compared with stock records.</p> <p>Record of opened and unopened vial wastage should be maintained in Stock control register. (Stock control register should have provision to record wastage)</p> <p>Maintain the records of discarded vaccines for at least 3 years. The internal review of such records should be carried out at least twice a year.</p> <p>Disposal should be in accordance with SOP.</p> <p>Implementation of Online Inventory Management System needs to be expanded to lowest distribution level.</p>
7	LD, SP	E7	<p>There should be a reporting system which monitors actual vaccine distributions and compare these with planned distributions.</p> <ul style="list-style-type: none"> • The system should have provision to prepare routine reports on internal vaccine distributions, summarizing the details of each and every transaction. • VVM Status should be recorded in the arrival section of issue voucher by the receiving store. • Lost and adjustment form (AGF form number 50) should be used to adjust stock records. <p>If conditioned ice packs are used to pack vaccines for distribution, freeze indicators should be packed with every deliveries of freeze sensitive vaccines.</p> <p>Short shipment should be recorded and corrected before the arrival of next scheduled delivery.</p>
8	SN, LD	E8	<p>Periodic basic and refresher training for capacity enhancement on vaccine management which includes:</p> <ul style="list-style-type: none"> • Knowledge on stock management, loss and adjustment, monitoring and comparison of actual vaccine distributions and planned distributions, calculation of wastage rate data. • Immunization reports and other standard routine reporting system
9	LD, SP	E9	<p>Supportive supervisions should take place at least once per quarter and such visits should be documented.</p> <p>Provision should be made for training and capacity building for newly</p>

No.	Levels	Criterion	Recommendation
			appointed staffs regarding cold chain, immunization and Standard Operating Procedures for Effective Vaccine Management.
10	SP	E2	(Thermometer) 30 DTM Devices should be made available in service delivery level where there is no temperature monitoring device and daily temperature should be monitored and recorded in temperature monitoring form.
11	SP	E3	Contingency plan poster should be developed for emergency situations.
12	SP	E4	<p>Arrangements should be made for repair and renovation of buildings (repair for internal leakages, sever cracks on walls, floors levelled, drainage system)</p> <p>Vaccine sub stores should have fire extinguishers</p> <p>Non PQS and Non-repairable CCE should be replaced with PQS equipment.</p> <p>Facility with problem of frequent power cut should have a stand by generator.</p> <p>Voltage regulator for each CCE in facilities with problem of frequent voltage fluctuation.</p> <p>Functioning temperature records as recommended by SOP.</p>
	SD	E8	MDVP should be adapted. Health worker should know about the MDVP Policy adapted by the country.



Regional Medical Store

RMS Biratnagar



क्र.सं.	विवरण	मा.सं.	मा.मूल्य	कुल.मूल्य	विवरण	मा.सं.	मा.मूल्य	कुल.मूल्य
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२०६० सालको पाठ्य पुस्तिका

१) MF-304 विद्यार्थीको - ५ तौ श्रेणी - ५ तौ पाठ्य पुस्तिका
 २) MF-304 विद्यार्थीको - ५ तौ श्रेणी - ५ तौ पाठ्य पुस्तिका
 ३) MF-304 विद्यार्थीको - ५ तौ श्रेणी - ५ तौ पाठ्य पुस्तिका

२०६० सालको पाठ्य पुस्तिका

१) MF-304 विद्यार्थीको - ५ तौ श्रेणी - ५ तौ पाठ्य पुस्तिका
 २) MF-304 विद्यार्थीको - ५ तौ श्रेणी - ५ तौ पाठ्य पुस्तिका
 ३) MF-304 विद्यार्थीको - ५ तौ श्रेणी - ५ तौ पाठ्य पुस्तिका

१) ५ तौ श्रेणी विद्यार्थीको पाठ्य पुस्तिका (विद्यार्थीको नाम र पता सहित) लेख्नुपर्नेछ।
 २) ५ तौ श्रेणी विद्यार्थीको पाठ्य पुस्तिका (विद्यार्थीको नाम र पता सहित) लेख्नुपर्नेछ।
 ३) ५ तौ श्रेणी विद्यार्थीको पाठ्य पुस्तिका (विद्यार्थीको नाम र पता सहित) लेख्नुपर्नेछ।



RMS Hetauda





नेपाल सरकार
स्वास्थ्य मन्त्रालय
स्वास्थ्य सेवा विभाग
म.प.क्षेत्रीय स्वास्थ्य निर्देशनालय
मध्य-पश्चिमाञ्चल क्षेत्रीय मेडिकल स्टोर, नेपालगञ्ज

तेप वितरण योजना :

क्र.सं.	जिल्लाको नाम	क्षेत्र	क्षेत्रको नाम	वितरण गर्ने स्थान	वितरण गर्ने तारीख	वितरण गर्ने मात्रा	वितरण गर्ने स्थिति	वितरण गर्ने मिति	वितरण गर्ने स्थिति	वितरण गर्ने मिति	वितरण गर्ने स्थिति
१	बाँके	१	१	१	१	१	१	१	१	१	१
२	बाँके	२	२	२	२	२	२	२	२	२	२
३	बाँके	३	३	३	३	३	३	३	३	३	३
४	बाँके	४	४	४	४	४	४	४	४	४	४
५	बाँके	५	५	५	५	५	५	५	५	५	५
६	बाँके	६	६	६	६	६	६	६	६	६	६
७	बाँके	७	७	७	७	७	७	७	७	७	७
८	बाँके	८	८	८	८	८	८	८	८	८	८
९	बाँके	९	९	९	९	९	९	९	९	९	९
१०	बाँके	१०	१०	१०	१०	१०	१०	१०	१०	१०	१०
११	बाँके	११	११	११	११	११	११	११	११	११	११
१२	बाँके	१२	१२	१२	१२	१२	१२	१२	१२	१२	१२
१३	बाँके	१३	१३	१३	१३	१३	१३	१३	१३	१३	१३
१४	बाँके	१४	१४	१४	१४	१४	१४	१४	१४	१४	१४
१५	बाँके	१५	१५	१५	१५	१५	१५	१५	१५	१५	१५
१६	बाँके	१६	१६	१६	१६	१६	१६	१६	१६	१६	१६
१७	बाँके	१७	१७	१७	१७	१७	१७	१७	१७	१७	१७
१८	बाँके	१८	१८	१८	१८	१८	१८	१८	१८	१८	१८
१९	बाँके	१९	१९	१९	१९	१९	१९	१९	१९	१९	१९
२०	बाँके	२०	२०	२०	२०	२०	२०	२०	२०	२०	२०
२१	बाँके	२१	२१	२१	२१	२१	२१	२१	२१	२१	२१
२२	बाँके	२२	२२	२२	२२	२२	२२	२२	२२	२२	२२
२३	बाँके	२३	२३	२३	२३	२३	२३	२३	२३	२३	२३
२४	बाँके	२४	२४	२४	२४	२४	२४	२४	२४	२४	२४
२५	बाँके	२५	२५	२५	२५	२५	२५	२५	२५	२५	२५
२६	बाँके	२६	२६	२६	२६	२६	२६	२६	२६	२६	२६
२७	बाँके	२७	२७	२७	२७	२७	२७	२७	२७	२७	२७
२८	बाँके	२८	२८	२८	२८	२८	२८	२८	२८	२८	२८
२९	बाँके	२९	२९	२९	२९	२९	२९	२९	२९	२९	२९
३०	बाँके	३०	३०	३०	३०	३०	३०	३०	३०	३०	३०



INVENTORY OF CCE
Regional Medical Store, Nepalgunj

S.N.	Name of Equipments	Manufacturer/Brand	Capacity	Status	Remark
1	Walk in Cooler (WIC)	Eveready	15482 ltrs.	OK	
2	Cold Bank		15157 ltrs.	OK	
3	Walk in Cooler (WIC)	Hurry	8803 ltrs.	OK	
4	Deep Freezer (DF)	Domestic, Luxembourg	209 ltrs.	OK	
5	Deep Freezer	Sanyo, Japan	174 ltrs.	OK	
6	Deep Freezer	Sanyo, Japan	174 ltrs.	OK	
7	Deep Freezer	Sanyo, Japan	185 ltrs.	Under Maintenance	
8	Deep Freezer	Esteeen	133 ltrs.	OK	
9	Ice Pack Freezer	Domestic	40560 ltrs.	OK	
10	Total Capacity	Lombardini, Italy	11 KVA	OK	Full at
11	Generator	Kirloskar, India	25 KVA	OK	Full at
12	Generator	Hikake, China	15.2 KVA	OK	
13	Generator	SOMI, Japan	10.45 KVA	Under Maintenance	
14	AVR	Matsunaga, Japan		OK	

RMS Dhangadi

सुदूर पश्चिमाञ्चल क्षेत्रीय स्वास्थ्य निर्देशनालय
सुदूर पश्चिमाञ्चल क्षेत्रीय मेडिकल स्टोर
तेप वितरण योजना

क्र.सं.	जिल्लाको नाम	क्षेत्र	क्षेत्रको नाम	वितरण गर्ने स्थान	वितरण गर्ने तारीख	वितरण गर्ने मात्रा	वितरण गर्ने स्थिति	वितरण गर्ने मिति	वितरण गर्ने स्थिति	वितरण गर्ने मिति	वितरण गर्ने स्थिति
१	बाँके	१	१	१	१	१	१	१	१	१	१
२	बाँके	२	२	२	२	२	२	२	२	२	२
३	बाँके	३	३	३	३	३	३	३	३	३	३
४	बाँके	४	४	४	४	४	४	४	४	४	४
५	बाँके	५	५	५	५	५	५	५	५	५	५
६	बाँके	६	६	६	६	६	६	६	६	६	६
७	बाँके	७	७	७	७	७	७	७	७	७	७
८	बाँके	८	८	८	८	८	८	८	८	८	८
९	बाँके	९	९	९	९	९	९	९	९	९	९
१०	बाँके	१०	१०	१०	१०	१०	१०	१०	१०	१०	१०
११	बाँके	११	११	११	११	११	११	११	११	११	११
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१३	बाँके	१३	१३	१३	१३	१३	१३	१३	१३	१३	१३
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१७	बाँके	१७	१७	१७	१७	१७	१७	१७	१७	१७	१७
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२६	बाँके	२६	२६	२६	२६	२६	२६	२६	२६	२६	२६
२७	बाँके	२७	२७	२७	२७	२७	२७	२७	२७	२७	२७
२८	बाँके	२८	२८	२८	२८	२८	२८	२८	२८	२८	२८
२९	बाँके	२९	२९	२९	२९	२९	२९	२९	२९	२९	२९
३०	बाँके	३०	३०	३०	३०	३०	३०	३०	३०	३०	३०

Government of Nepal
Ministry of Health Service
Department of Health Service
Farwest Regional Medical Store, Dhangadhi
Stock Status of Vaccines, Syringe and Safety Box

S.N.	Name of Vaccine	Unit Dose	Unit	Safety Stock	Minimum stock	Maximum stock	Remark
1	B.C.G Vaccine	20 dose	Ampule	1683	5049	7573	
2	B.C.G Diluent	Ampule (pcs)	Pc	1683	5049	7573	
3	D.p.t Hepb+Hib	10 dose	Vial	1892	5676	8514	
4	bopv	10 dose	Vial	1892	5676	8514	
5	bopv Dropper	Pcs	Pc	1892	5676	8514	
6	IPV	10 dose	Vial	784	2352	3528	
7	J.P.C.V.	2 dose	Vial	8416	25248	37872	
8	Meales + Rubela (MR)	10 dose	Vial	2174	6522	9783	
9	Meales + Rubela Diluent	Ampule (pcs)	Pc	2174	6522	9783	
10	J.E. Vaccing	5 Dose	Vial	2083	6249	9373	
11	J.E. Diluent	Pcs	Pc	2083	6249	9373	
12	T.D Vaccine	10 dose	Vial	1464	4392	6588	
13	A.D. Syring 2 ml	Pcs	Pc	1868	5604	8406	
14	A.D. Syring 5ml	Pcs	Pc	4725	14175	21262	
15	A.D.0.05 ml	Pcs	Pc	5931	17793	26689	
16	A.D.0.5 ml	Pcs	Pc	6090	18270	27405	
17	Safety box	Pcs	Pc	126	378	567	

Department of Health Service
Farwest Regional Medical Store, Dhangadhi
Distribution List Of Vaccines, Syringes and safety Box

Category	Year	Order No	Quantity	Received	Balance	Remarks	Order No	Quantity	Received	Balance	Remarks	Order No	Quantity	Received	Balance	Remarks
Vaccine	2018	850	500	500	0		850	500	500	0		850	500	500	0	
Syringe	2018	850	500	500	0		850	500	500	0		850	500	500	0	
Safety Box	2018	850	500	500	0		850	500	500	0		850	500	500	0	

सुरत अण्डर आले डिसेरी माणसामातको खाता
(C.C.T)

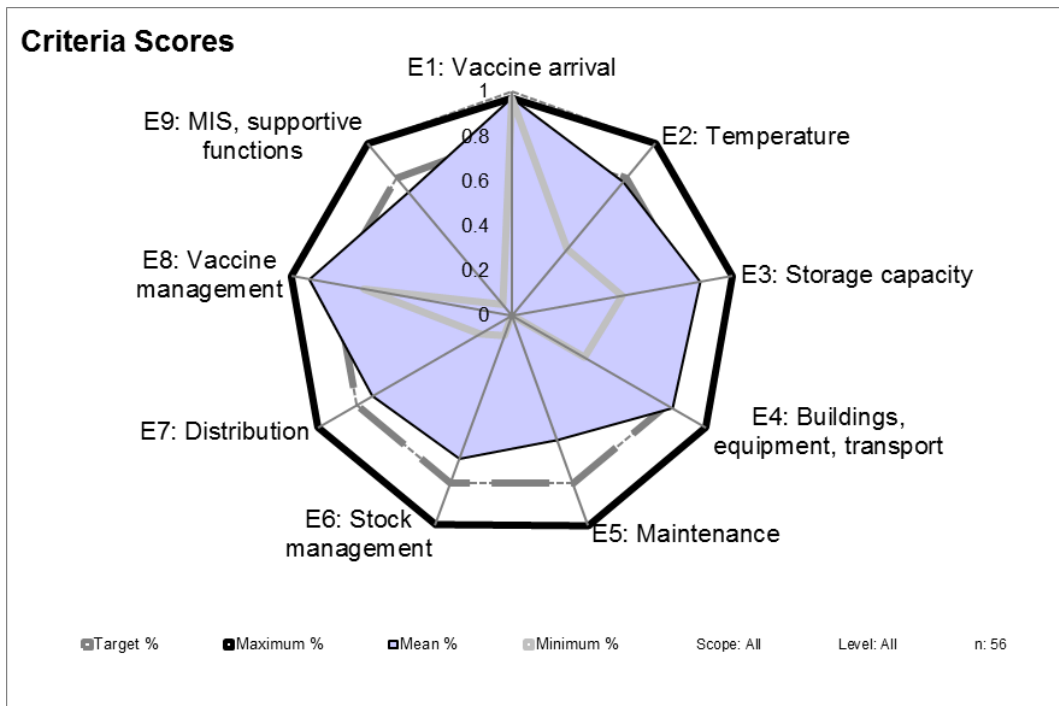
दिनांक	प्राप्त	व्यय	सन्तुलन	शेष
01/01/2018	207	-	-	207
02/01/2018	50	-	-	257
03/01/2018	50	-	-	307
04/01/2018	50	-	-	357
05/01/2018	50	-	-	407
06/01/2018	50	-	-	457
07/01/2018	50	-	-	507
08/01/2018	50	-	-	557
09/01/2018	50	-	-	607
10/01/2018	50	-	-	657
11/01/2018	50	-	-	707
12/01/2018	50	-	-	757
कुल	500	0	0	1257

जलमपन - Temperature Mapping Sheet

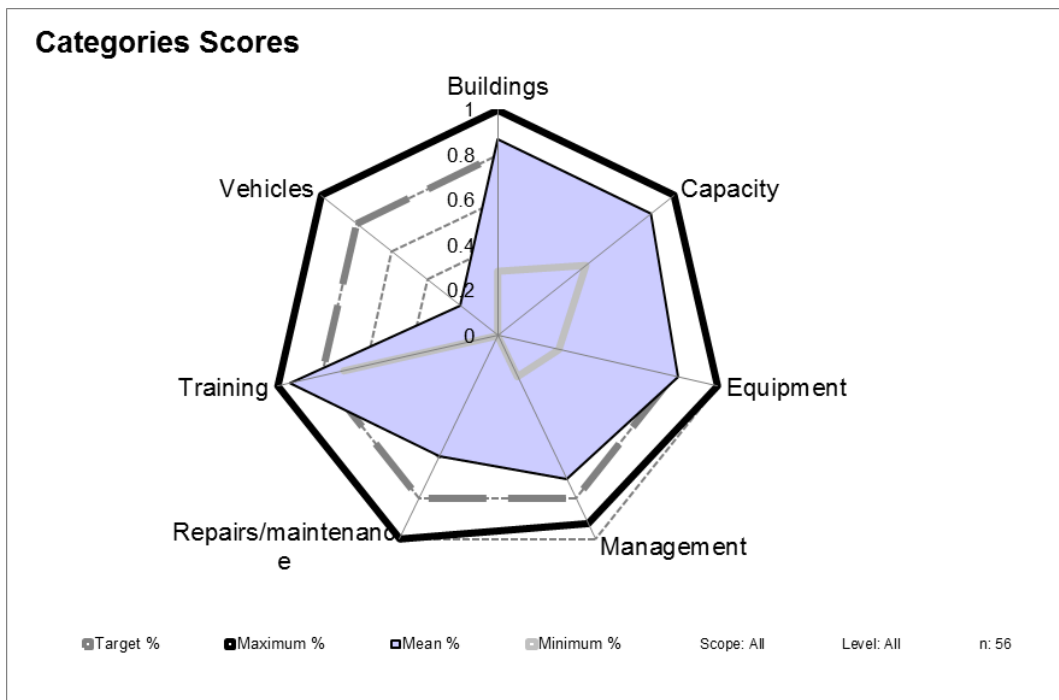
Location	Temperature (°C)	Humidity (%)	Remarks
1st Rack (Door Right Side)	18.2	45	OK
2nd Rack (Door Right Side)	18.1	45	OK
3rd Rack (Door Right Side)	18.0	45	OK
4th Rack (Door Right Side)	17.9	45	OK
5th Rack (Middle of W/C)	17.8	45	OK
6th Rack Room (Middle of W/C)	17.7	45	OK
7th Rack Room (Middle of W/C)	17.6	45	OK
8th Rack Room (Middle of W/C)	17.5	45	OK
9th Rack (Front of Door)	17.4	45	OK
10th Rack (Front of Door)	17.3	45	OK
11th Rack (Front of Door)	17.2	45	OK
12th Rack (Front of Door)	17.1	45	OK

Annex 2 – Spider web charts

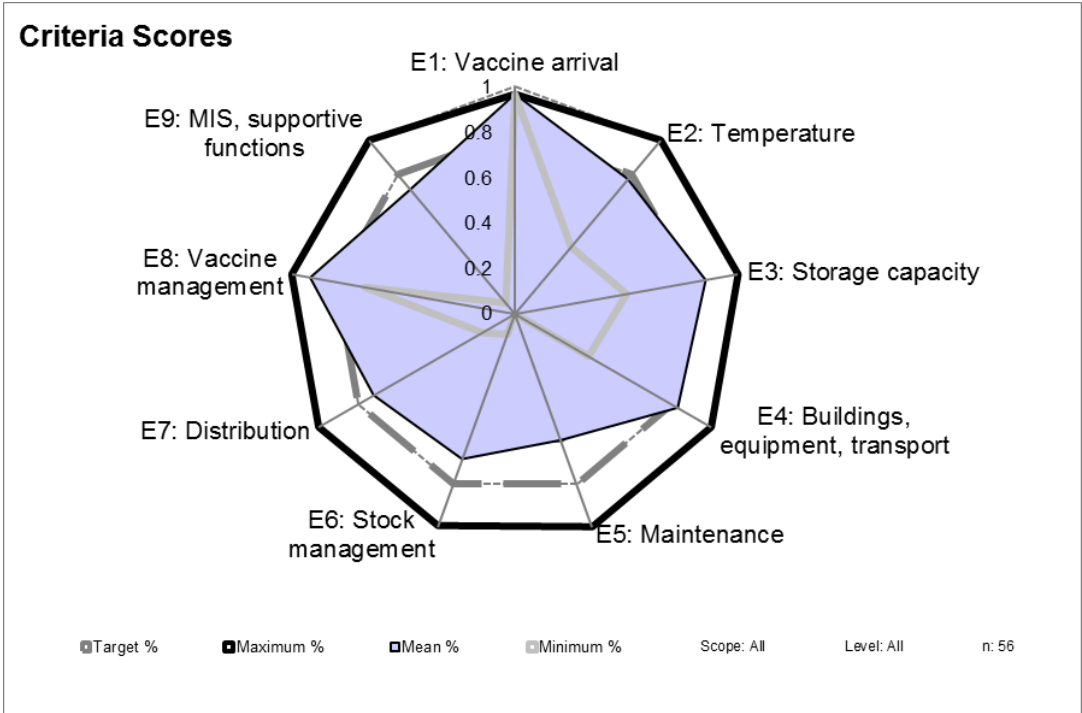
PR criteria scores (spider web)



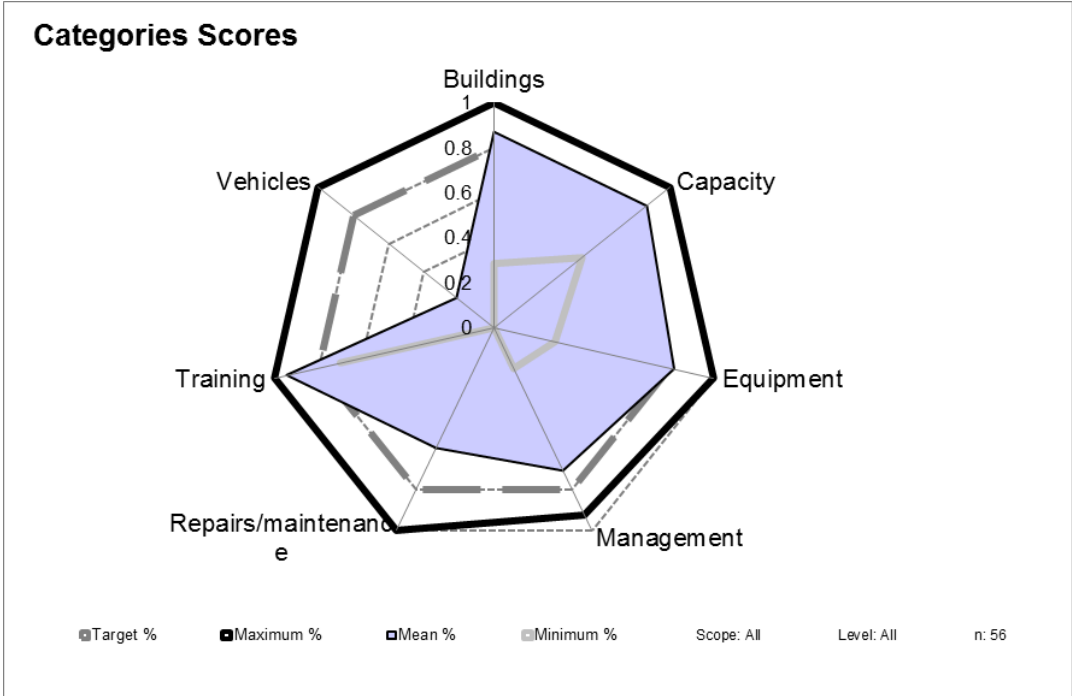
PR categories scores (spider web)



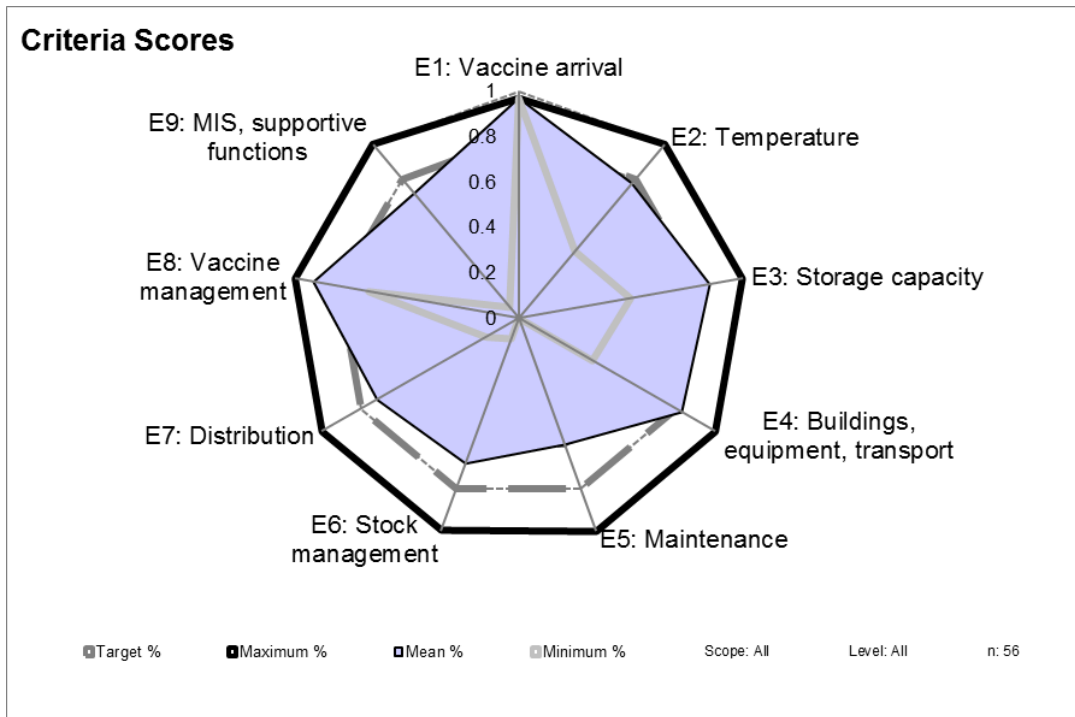
SN criteria scores (spider web)



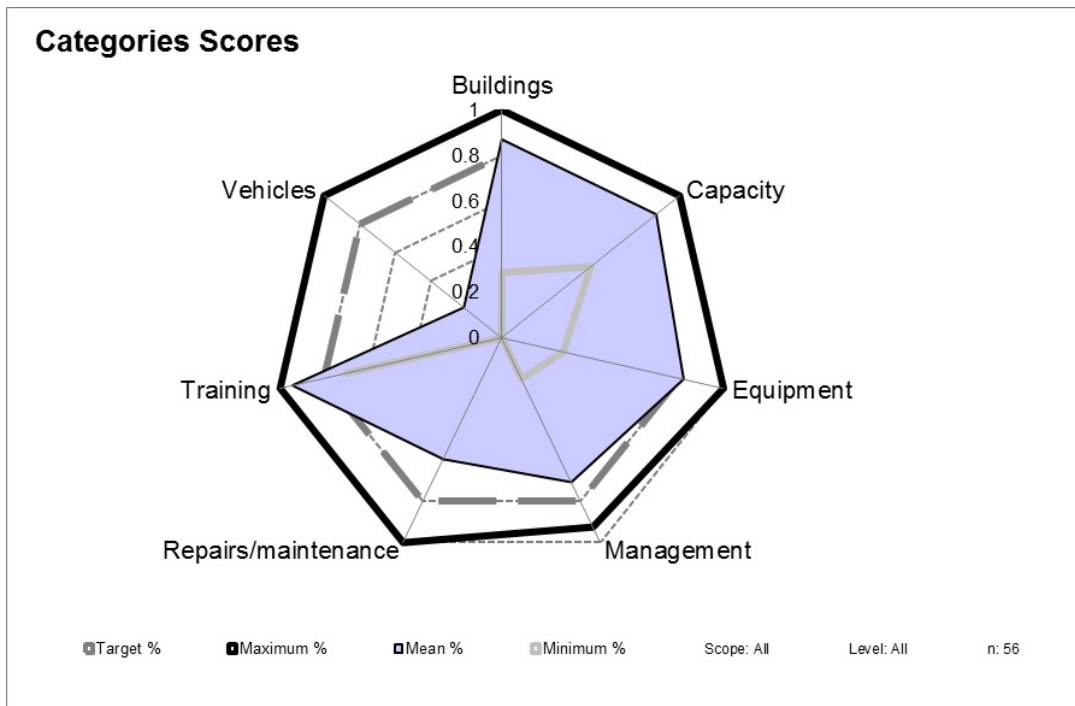
SN category scores (spider web)



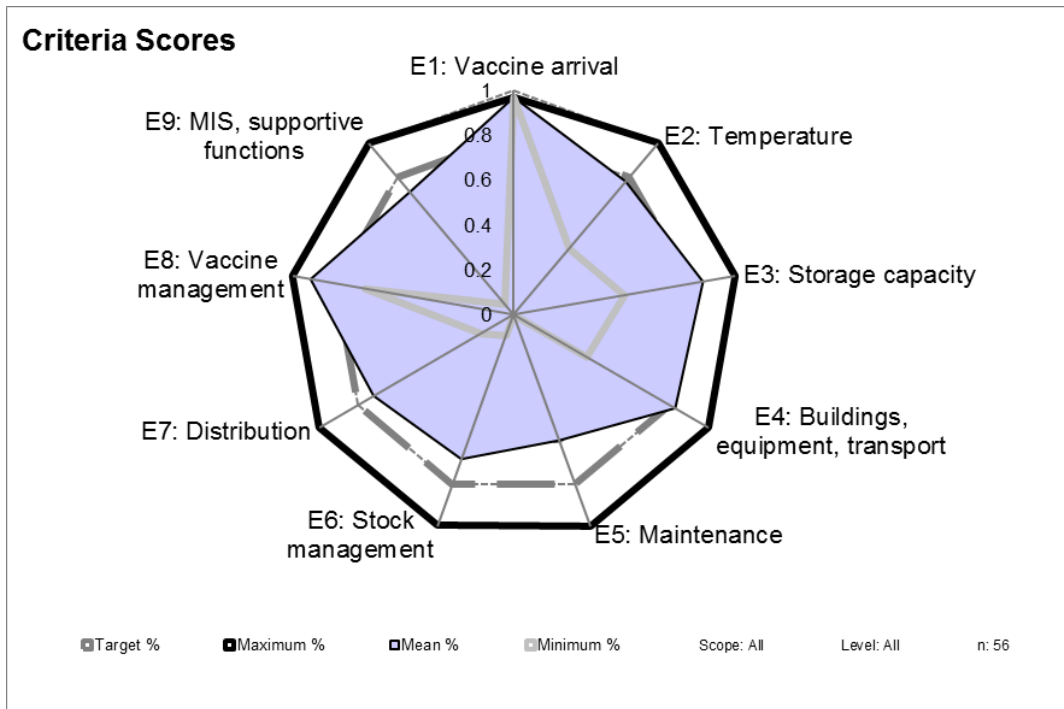
LD criteria scores (spider web)



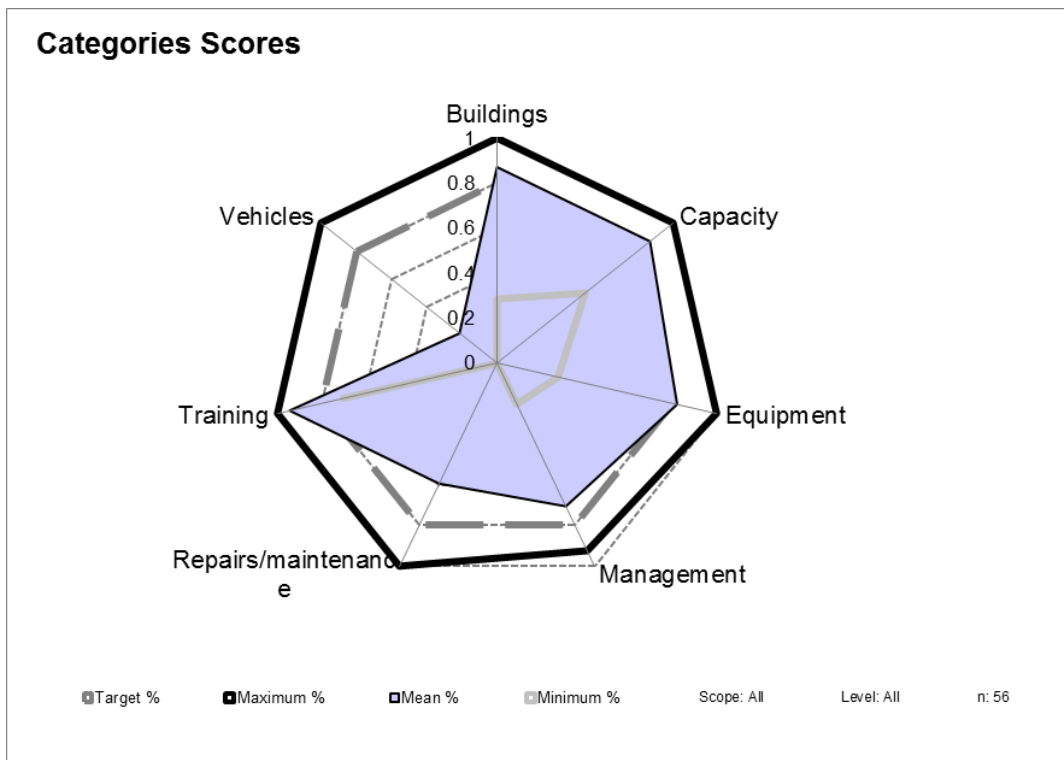
LD category scores (spider web)



SP criteria scores (spider web)



SP category scores (spider web)



Annex 3 - Screenshot from EVM Site Selection Tool

Immunization supply chain levels			Population Data		Cluster Calculation																			
Primary 1PR	Sub-national 1SN	Lowest Distribution LD	Population of Each LD	Cumulative Population	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CVS	Regional Medical Stores	District Vaccine Stores	0	0	77,530	1,508,754	2,939,969	4,371,183	5,802,398	7,233,613	8,664,828	10,096,043	11,527,257	12,958,472	14,389,687	15,820,902	17,252,117	18,683,331	20,114,546	21,545,761	22,976,976	24,408,191	25,839,405	27,270,620
		Darbhanga	140,299	140,299	77,530	1,508,754	2,939,969	4,371,183	5,802,398	7,233,613	8,664,828	10,096,043	11,527,257	12,958,472	14,389,687	15,820,902	17,252,117	18,683,331	20,114,546	21,545,761	22,976,976	24,408,191	25,839,405	27,270,620
Teku	FWR RMS Dhangadi	Baitadi	260,744	401,043																				
Teku	FWR RMS Dhangadi	Dadedhura	152,222	553,265																				
Teku	FWR RMS Dhangadi	Kanchanpur	499,079	1,052,344																				
Teku	FWR RMS Dhangadi	Kailali	881,031	1,933,375		1,508,754																		
Teku	FWR RMS Dhangadi	Doti	213,473	2,146,848																				
Teku	FWR RMS Dhangadi	Jasham	276,190	2,423,046																				
Teku	FWR RMS Dhangadi	Bajhang	211,653	2,634,699																				
Teku	FWR RMS Dhangadi	Bajura	147,526	2,782,225																				
Teku	MWR RMS Nepal(gun)	Humla	55,719	2,837,944																				
Teku	MWR RMS Nepal(gun)	Mugu	60,615	2,898,559																				
Teku	MWR RMS Nepal(gun)	Kalikot	150,679	3,049,238			2,939,969																	
Teku	MWR RMS Nepal(gun)	Jumla	118,895	3,168,133																				
Teku	MWR RMS Nepal(gun)	Dolpa	40,157	3,208,290																				
Teku	MWR RMS Nepal(gun)	Jajarkot	187,950	3,396,240																				
Teku	MWR RMS Nepal(gun)	Darilekh	283,805	3,680,045																				
Teku	MWR RMS Nepal(gun)	Surkhet	391,813	4,071,858																				
Teku	MWR RMS Nepal(gun)	Bardiya	459,535	4,531,393				4,371,183																
Teku	MWR RMS Nepal(gun)	Banke	561,497	5,092,890																				
Teku	MWR RMS Nepal(gun)	Dang	611,384	5,704,274																				
Teku	MWR RMS Nepal(gun)	Salyan	260,990	5,965,264					5,802,398															
Teku	MWR RMS Nepal(gun)	Rukum	221,163	6,186,427																				
Teku	MWR RMS Nepal(gun)	Rojap	233,033	6,419,460																				
Teku	MWR RMS Nepal(gun)	Pyuthan	237,212	6,656,672																				
Teku	WR RMS Butwal	Aaghakhanchi	201,055	6,857,727																				
Teku	WR RMS Butwal	Kapilvastu	631,159	7,488,886						7,233,613														
Teku	WR RMS Butwal	Rupandehi	993,886	8,482,772																				
Teku	WR RMS Butwal	Nawalparasi	695,484	9,178,256							8,664,828													
Teku	WR RMS Butwal	Palpa	254,203	9,432,459																				
Teku	WR RMS Butwal	Gulmi	266,635	9,699,094																				
Teku	WRHD Pokhara	Baglung	278,259	9,977,353																				
Teku	WRHD Pokhara	Parbat	148,083	10,125,436																				
Teku	WRHD Pokhara	Myagdi	112,330	10,237,766								10,096,043												
Teku	WRHD Pokhara	Mustang	12,327	10,250,093																				
Teku	WRHD Pokhara	Manang	6,422	10,256,515																				
Teku	WRHD Pokhara	Kaski	549,288	10,805,803																				
Teku	WRHD Pokhara	Syangja	267,464	11,073,267																				
Teku	WRHD Pokhara	Tanahun	337,847	11,411,114																				
Teku	WRHD Pokhara	Lamjung	170,651	11,581,765									11,527,257											
Teku	WRHD Pokhara	Gorkha	257,325	11,839,090																				
Teku	CR RMS Hetauda	Chitwan	651,092	12,490,182																				
Teku	CR RMS Hetauda	Parva	670,249	13,160,431										12,958,472										
Teku	CR RMS Hetauda	Bara	773,382	13,933,813																				
Teku	CR RMS Hetauda	Rautahat	781,366	14,715,179																				
Teku	CR RMS Hetauda	Makwanpur	446,207	15,161,386																				
Teku	Central Store, Teku	Dhading	347,755	15,509,141																				
Teku	Central Store, Teku	Rasuwa	44,463	15,553,604																				
Teku	Central Store, Teku	Nuwakot	284,169	15,837,773												15,820,902								
Teku	Central Store, Teku	Kathmandu	2,041,388	17,879,161													17,252,117							
Teku	Central Store, Teku	Bhaktapur	343,894	18,223,055																				
Teku	Central Store, Teku	Lalitpur	531,402	18,754,457																			18,683,331	
Teku	Central Store, Teku	Kavre	395,151	19,149,608																				
Teku	Central Store, Teku	Sindhupalchowk	292,475	19,442,083																				
Teku	Central Store, Teku	Dolakha	187,401	19,629,484																				
Teku	Central Store, Teku	Ramechhap	206,827	19,836,311																				
Teku	CR RMS Hetauda	Sindhuli	305,800	20,142,111														20,114,546						
Teku	CR RMS Hetauda	Serahi	845,921	20,988,032																				
Teku	CR RMS Hetauda	Mahottari	678,004	21,666,036																				
Teku	CR RMS Hetauda	Dhanusha	808,607	22,474,643																				
Teku	ERMS Biratnagar	Siraha	678,504	23,153,147																			22,976,976	
Teku	ERMS Biratnagar	Saptari	683,473	23,836,620																				
Teku	ERMS Biratnagar	Udayapur	341,412	24,178,032																				
Teku	ERMS Biratnagar	Khotang	187,605	24,365,637																				
Teku	ERMS Biratnagar	Okhaldhunga	150,492	24,516,129																				24,408,191
Teku	ERMS Biratnagar	Solukhumbu	104,053	24,620,182																				
Teku	ERMS Biratnagar	Bhojpur	167,077	24,787,259																				
Teku	ERMS Biratnagar	Sankhuwashahi	157,480	24,944,739																				
Teku	ERMS Biratnagar	Tehrathum	101,371	25,046,110																				
Teku	ERMS Biratnagar	Dhankuta	168,449	25,214,559																				
Teku	ERMS Biratnagar	Sunsari	854,308	26,068,867																				25,839,405
Teku	ERMS Biratnagar	Morang	1,044,071	27,112,938																				
Teku	ERMS Biratnagar	Jhapa	882,251	27,995,189																				
Teku	ERMS Biratnagar	Ilam	303,880	28,299,069																				27,270,620
Teku	ERMS Biratnagar	Panchthar	195,460	28,494,529																				
Teku	ERMS Biratnagar	Taplegun	129,767	28,624,296																				

Annex 4 - EVM Criteria score by Regions

EVM Nepal 2017 by criteria	E2	E3	E4	E5	E6	E7	E8	E9
ER RMS Biratnagar	96%	85%	89%	94%	96%	64%	95%	84%
CR RMS Hetauda	100%	64%	80%	96%	97%	95%	73%	81%
WR RMS Pokhara	67%	73%	85%	88%	63%	49%	94%	54%
WR RMS Butwal	97%	87%	95%	91%	95%	66%	100%	80%
MWR RMS Nepaljung	77%	100%	93%	70%	84%	58%	100%	81%
FWR RMS Dhangadi	100%	93%	100%	100%	93%	59%	95%	80%

Annex 5 - EVM Criteria score by Districts

EVM Nepal 2017 by criteria	E2	E3	E4	E5	E6	E7	E8	E9
Bardiya DVS	90%	100%	95%	83%	91%	63%	100%	81%
Darchula DVS	87%	100%	98%	85%	75%	70%	67%	81%
Jhapa DVS	100%	98%	83%	88%	84%	83%	94%	77%
Kailali DVS	81%	100%	95%	85%	91%	63%	89%	81%
Kalikot DVS	71%	100%	85%	35%	73%	91%	100%	85%
Kapilvastu DVS	100%	100%	90%	78%	86%	65%	92%	98%
Kathmandu DVS	96%	66%	91%	97%	69%	58%	100%	67%
Lalitpur DVS	90%	95%	95%	84%	99%	81%	92%	81%
Lamjung DVS	81%	93%	95%	65%	85%	65%	100%	94%
Mahottari DVS	62%	93%	95%	23%	78%	84%	78%	65%
Nawalparasi DVS	100%	88%	87%	90%	97%	63%	100%	94%
Nuwakot DVS	71%	100%	97%	46%	86%	95%	92%	40%
Okhaldhunga DVS	71%	83%	93%	100%	93%	86%	100%	99%
Parbat DVS	100%	100%	97%	85%	76%	58%	100%	84%
Parsa DVS	90%	94%	91%	97%	81%	86%	100%	72%
Rautahat DVS	81%	84%	85%	85%	70%	86%	92%	94%
Salyan DVS	71%	100%	97%	58%	65%	58%	77%	84%
Sindhuli DVS	81%	87%	93%	79%	92%	63%	95%	81%
Siraha DVS	71%	92%	92%	23%	62%	86%	95%	65%
Sunsari DVS	90%	100%	91%	31%	90%	77%	100%	76%

Annex 6 - EVM Criteria score by Health Facilities

EVM Nepal 2017 by criteria	E2	E3	E4	E5	E6	E7	E8	E9
Bastipur PHC	58%	92%	68%	6%	65%	100%	100%	75%
Bhadratara HP	77%	58%	70%	53%	73%	100%	80%	48%
Bhattedanda HP	87%	75%	100%	71%	49%	100%	94%	63%
Chandraswore Sub-vaccine store	81%	74%	74%	56%	54%	100%	81%	94%
Dhumkauli PHC	77%	100%	97%	65%	49%	55%	98%	73%
Gauda PHC	67%	50%	94%	17%	32%	100%	84%	50%
Gausala PHC	67%	50%	69%	0%	51%	100%	88%	54%
Gokuleswor PHC	100%	100%	92%	0%	17%	50%	90%	52%
Gotikhel HP	87%	100%	89%	88%	72%	55%	95%	75%
Huwas HP	77%	97%	86%	62%	82%	55%	100%	94%
Ishaneshwor HP	96%	75%	76%	50%	68%	55%	100%	81%
Itahari PHC	38%	50%	38%	25%	10%	77%	75%	6%
Jayanagar HP	67%	100%	65%	62%	61%	55%	93%	100%
Kalche HP	38%	83%	59%	47%	54%	55%	91%	75%
Kharanitar PHC	67%	71%	100%	65%	49%	100%	90%	57%
Kothariya PHC	38%	92%	43%	63%	34%	17%	88%	59%
Maharajgunj HP	38%	75%	50%	40%	35%	100%	77%	81%
Manebhanjyang HP	58%	100%	50%	33%	71%	100%	86%	65%
Mehelmundi HP	100%	50%	94%	33%	17%	55%	79%	75%
Pasti HP	96%	83%	89%	40%	60%	100%	90%	31%
Rajapur PHC	71%	100%	60%	54%	78%	55%	85%	94%
Raniban PHC	77%	100%	55%	19%	79%	58%	96%	65%
Ranipani HP	77%	83%	84%	57%	80%	55%	91%	75%
Samsi PHC	67%	50%	46%	33%	51%	100%	90%	25%
Santpur PHC	42%	75%	77%	71%	66%	58%	92%	69%
Sedhwa PHC	90%	67%	81%	50%	35%	17%	96%	63%
Sirthauli PHC	58%	100%	86%	25%	42%	100%	100%	75%
Tharmare PHC	67%	70%	94%	67%	53%	55%	100%	75%
Tikapur Hospital	71%	83%	93%	46%	57%	55%	98%	60%

Annex 7 - Effective Vaccine Improvement Plan 2017-19

Based on the results and recommendations from the Effective Vaccine Management Assessment 2017, the EVM Improvement Plan 2017-19 has been developed with the resource required for implementation.

Category	Key interventions and activities	Time scale			Means of verification	Responsible entity	Resources required (USD)
		2017	2018	2019			
E1	Vaccine Arrival Procedures (E1): Every shipment from the vaccine manufacturer reaches the receiving store in satisfactory condition and with correct paperwork.						
1.1	Revise and update standard operating protocol on vaccine contingency plan at customs, vaccine handling and custom clearance	X			SOPs	Child Health Division	500
1.2	Orientation to officials Ministry of finance and Ministry of Home affairs on vaccine contingency plan, vaccine handling and custom clearance	X			Meeting report	Child Health Division	200
1.3	Letter of exchange between Ministry of Health and Ministry of finance for rapid custom clearance and contingency plan	X			Letter of exchange	Child Health Division	0
1.4	Orientation to custom and cargo staff on vaccine handling and custom clearances	X			Orientation report	Logistic Management Division	300
1.5	Capacity building of the central and provincial vaccine store on using the product arrival report after each shipment	X	X		Training report	Logistic Management Division	3,000
E2	Vaccine Storage Temperatures Monitoring (E2): All vaccines and diluents are stored and distributed within WHO recommended temperature ranges.						

Category	Key interventions and activities	Time scale			Means of verification	Responsible entity	Resources required (USD)
		2017	2018	2019			
2.1	Procurement of remote temperature monitoring device at central store teku and Regional medical store/Provincial stores.		X	X	Procurement order receipt	Child Health Division	9,000
2.2	Development of training materials and videos how to monitor the using DTR and recording of alarm event	X			Training manuals	Logistic Management Division	2,000
2.3	On-site coaching on temperature recording and monthly review of the records at Regional/provincial level		X	X	On-site coaching report	Logistic Management Division	12,000
2.4	On-site Coaching from Provincial level to district level on temperature monitoring recording, review and action		X	X	On-site coaching report	Logistic Management Division	30,000
2.6	Two Days Orientation/Training to Central and regional/Province and district CCA/RT on Temperature recording and monitoring		X	X	Training report	Logistic Management Division	30,000
2.7	Monthly review of the temperature record in recommended format in each health facilities	X	X	X	Monthly review meeting notes	Health facilities	0
2.8	Updated DTR Inventory available at all level	X	X	X	Inventory report	Logistic Management Division	0
2.9	Supply the DTR to Regional Store from Central and to DH(P)Os from Regional store		X	X	Procurement order receipt	Logistic Management Division	40,000
E3	Cold & dry storage capacity (E3): Cold storage, dry storage and transport capacity is sufficient to accommodate all vaccines and supplies needed for the program.						

Category	Key interventions and activities	Time scale			Means of verification	Responsible entity	Resources required (USD)
		2017	2018	2019			
3.1	Development policy and strategy for replacement of icepacks with cool packs and endorse by MoH.	X			Icepack and cool pack replacement strategy	Child Health Division	1,000
3.2	Distribute standard contingency plan format from central to all level and monitor	X			Distribution report	Child Health Division	200
3.3	Installation of 40 metric cube Walk-in-cooler at central vaccine store	X			Installation report	Child Health Division	70,000
3.4	Installation of 15 metric cube Walk-in-cooler at each regional vaccine stores	X			Installation report	Child Health Division	30,000
3.5	Procurement refrigerators for Partial replacement of obsolete/ non-functioning CFC equipment as per Replacement and Deployment Plan		X	X	Procurement report	Child Health Division	2,330,000
3.6	Mobilization of technical staffs for replacement/ modification of ice pack freezers and on-site coaching to concerned personnel on use of cool packs	X	X	X	Field visit report	Logistic Management Division	70,000
3.7	Contingency plan available in flex and review annually at all level		X	X	Field monitoring report	Child Health Division	1000
E4	Buildings, CC equipment & transport system (E4): Buildings, cold chain equipment and transport systems enable the vaccine and consumables supply chain to function effectively						
4.1	Advocacy meeting with local bodies for budget provision for repair and renovate the building	X	X	X	Advocacy meeting report	Child Health Division	15000

Category	Key interventions and activities	Time scale			Means of verification	Responsible entity	Resources required (USD)
		2017	2018	2019			
	and fire extinguisher						
4.2	Procure and provide fire extinguisher at all level as per need	X	X	X	Procurement order receipt	Logistic Management Division	3,000
4.3	Update inventory of non PQS and non-repairable CCE	X	X	X	Inventory report	Logistic Management Division	0
4.4	Make the auctioning of non PQS and non-repairable CCE	X	X	X	Auctioning report	Logistic Management Division	30,000
4.5	Procure the PQS CCE equipment for replacement according to segmentation plan		X	X	Procurement order receipt	Logistic Management Division	1,000,000
4.6	Procurement and installation standby generator	X	X	X	Procurement order receipt	Child Health Division	50,000
4.7	Procurement and installation voltage regulator for all level		X	X	Procurement order receipt	Child Health Division	50,000
E5	Maintenance (E5): Maintenance of buildings, cold chain equipment and vehicles is satisfactory						
5.1	Develop and review the National guideline for Planned Preventive Maintenance (PPM)	X			Guideline	Child Health Division	5000
5.3	Resource allocation for preventive planned maintenance at all level	X	X	X	Annual workplan and budget	Logistic Management Division	80000
E6	Stock Management (E6): Stock management systems and procedures are effective						
6.1	Supply of sufficient relevant register and forms (Stock book, ISR Form, Handover forms, Receipt and requisition forms etc.)	X	X	X	Distribution plan report	Logistic Management Division	50,000
6.2	On-site mentoring to update the stock register within one working day	X	X	X	On-site mentoring report	Regional Medical Store	45,000

Category	Key interventions and activities	Time scale			Means of verification	Responsible entity	Resources required (USD)
		2017	2018	2019			
	of transactions upon arrival and dispatch of vaccine through online system/ monthly reporting/ periodic supervision and monitoring						
E7	Distribution (E7): Distribution between each level in the supply chain is effective						
7.1	Annual review with districts immunization and cold chain officer to improve the annual/ monthly distribution plan, update stock control register and monthly physical count.	X	X	X	Annual review report	Regional Medical Store	250,000
7.2	Supply and replacement of freeze indicators (Freeze Tag) as per need	X	X	X	Procurement order receipt	Logistic Management Division	30,000
7.3	Review of record the vaccine status stated by every freeze indicators in ISR form and return freeze indicators to the issuing stores during next visit	X	X	X	Record review report	District Health Office	0
E8	Vaccine Management Practices (E8): Appropriate vaccine management policies are adopted and implemented.						
8.1	Development and design of four days Refresher training package on EVM SOP	X			Training manual	Child Health Division	4,000
8.2	Refresher training on EVM SOP at all level	X	X	X	Training report	Logistic Management Division	90,000
8.3	Basic training on EVM SOP for newly recruited EPI/ Cold chain personnel.	X	X	X	Training report	Logistic Management Division	45,000
8.4	Training of trainers on CCE maintenance and	X	X	X	Training report	Logistic Management	70,000

Category	Key interventions and activities	Time scale			Means of verification	Responsible entity	Resources required (USD)
		2017	2018	2019			
	repair to refrigeration technicians and Engineers					Division	
E9	Information Systems and Supportive Management Functions (E9): Information systems and supportive management functions are satisfactory.						
9.1	Support EVM Committee at central level for review of EVM IP implementation	X	X	X	EVM Committee meeting notes	Child Health Division	10,000
9.2	Allocation of budget for routine supervision	X	X	X	Annual workplan and budget	Child Health Division	35,000