


## Application Form for Cold Chain Equipment Optimisation Platform Support in 2018

Document Dated: November 2017

	<p><b>Purpose of this document:</b></p> <p>This application form must be completed in order to apply for support related to the CCE Optimisation Platform.</p> <p>Applicants are required to read the <b>Application guidelines</b> and <b>How to request new Gavi support</b> documents. Thereafter, applicants should complete this CCE Application Form and submit by email to <a href="mailto:proposals@gavi.org">proposals@gavi.org</a>.</p>
  	<p><b>Resources to support completing this application form:</b></p> <p><b>Technology guide for equipment selection</b> for counties wishing to request CCE Optimisation Platform support is available here: <a href="http://www.gavi.org/support/hss/cold-chain-equipment-optimisation-platform/">www.gavi.org/support/hss/cold-chain-equipment-optimisation-platform/</a></p> <p><b>Extensive technical resources</b> relating to vaccine cold chain equipment management are available on TechNet-21: <a href="http://www.technet-21.org/en/resources/cold-chain-equipment-management">www.technet-21.org/en/resources/cold-chain-equipment-management</a></p>
<p><b>Weblinks and contact information:</b></p> <p>All application documents are available on the Gavi Apply for Cold Chain Equipment support webpage: <a href="http://www.gavi.org/support/process/apply/cceop/">http://www.gavi.org/support/process/apply/cceop/</a>. For any questions regarding the application guidelines please contact <a href="mailto:countryportal@gavi.org">countryportal@gavi.org</a> or your Gavi Senior Country Manager (SCM).</p>	

	<p>Countries are informed that based on post-IRC recommendations, <b>final approved amounts may be different</b> from what countries have requested.</p> <p><b>This final approved amount will be dependent on the availability of funding.</b></p> <p><b>Gavi will respect countries' equipment selection. However, countries could also receive their 2<sup>nd</sup> or 3<sup>rd</sup> preference based on their selection in the budget.</b></p>
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## PART A: APPLICANT INFORMATION

1. Applicant information	
<b>Country</b>	Bangladesh
<b>Date</b>	August, 2018
<b>Contact name</b>	Dr. Md. Rezaur Rahman Khan, Program Manager, EPI & Surveillance
<b>Email address</b>	pmepi.dghs@gmail.com
<b>Phone number</b>	+88029881993
<b>Total funding requested from CCE Optimisation Platform (US \$)</b>	<i>Total budget is \$ 4,083,882, of which country co-investment will be \$ 2,041,941 and Gavi investment will be \$ 2,041,941</i>
<b>Does your country have an approved Gavi HSS support on-going?</b>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
	<i>Indicate the anticipated <b>final year</b> of the HSS: <b>2018</b></i>
<b>Proposed CCE Optimisation Platform support start date</b> <i>(please be informed the actual start date should be at least 8-10 months from application date):</i>	<i>Indicate the month and year of the planned start date of the support, based on the strategic deployment plan: April <b>2019</b></i>
<b>Proposed CCE Optimisation Platform support end date:</b>	<i>Indicate the month and year of the planned end date of the support, based on the strategic deployment plan: <b>Dec 2022</b></i>
<b>Signatures</b> <i>Include signed (and official) CCE Optimisation Platform application endorsement by:</i> a) <i>Minister of Health and Minister of Finance (or delegated authorities)</i> b) <i>Members of the Coordination Forum (HSCC/ICC or equivalent body)</i>	<i>We the undersigned, affirm the objectives and activities of the Gavi CCE Optimisation Platform proposal are fully aligned with the national health strategic plan (or equivalent) and that the funds for implementing all activities, including domestic funds and any needed joint investment, will be included in the annual budget of the Ministry of Health:</i>  <b>Minister of Health (or delegated authority) Minister of Health (or delegated authority)</b> Name: _____ Name: _____  Signature: _____ Signature: _____  Date: _____ Date: _____

## PART B: MANDATORY ATTACHMENTS: NATIONAL STRATEGIES AND PLANS

This section provides a list of national strategies, plans and documents relevant to supply chain and requested support, which must be attached as part of the application.

	All documents listed in the table below are <b>mandatory</b> , must be <b>attached</b> to your application, and they must be <b>final</b> and <b>dated</b> . Only <b>complete applications</b> will be assessed.
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2. Mandatory attachments					
No.	Strategy / Plan / Document	Attached Yes/No	Final version (dated)	Duration	Comments
1	Signature sheet for the Minister of Health and Minister of Finance, or their delegates	Yes	27 August 2018		Doc # 1
2	Minutes of the Coordination Forum meeting (ICC, HSCC or equivalent) endorsing the proposal <sup>1</sup>	Yes	27 August 2018		Doc # 2
3	National Health Sector Development Plan (NHSDP)	Yes	Jan 2017	5½ Yrs	Doc # 3
4	cMYP	Yes	2014	5 Yrs	Doc # 4
5	EVM Assessment	Yes	2014	NA	Doc # 5
6	EVM Improvement Plan	Yes	2014	NA	Doc # 6
7	EVM Annual Work-plan <b>and</b> Progress Report on EVM Improvement Plan <sup>2</sup>	Yes	2015	4 Yrs	Doc # 7
8	WHO CCEI Tool/UNICEF IMT/PATH CCEM Tool/CHAI tool <sup>3,4</sup>  Supplementary documents of CCEI and CCEOP implementation budget	Yes	August 2018	NA	Doc # 8, Doc # 8.1, Doc # 8.2, Doc # 8.3, Doc # 8.4, Doc # 8.5, Doc # 8.6, Doc # 8.7
9	Inventory Report and Facilities segmentation	Yes	August 2018	NA	Doc # 9
10	Single document: Chapter 1: Cold Chain Rehabilitation and Expansion Plan	Yes	August 2018		Doc # 10

<sup>1</sup> In the case of HSS and CCE Optimisation Platform requests, minutes must reflect that both were discussed and endorsed.

<sup>2</sup> The EVM IP and annual work plan progress report must have been updated within three (3) months before applying for Platform support.

<sup>3</sup> The CCE Inventory must have been updated within no more than one (1) year of applying for Platform support.

<sup>4</sup> Tool should allow reviewers to understand targeting of equipment to locations relative to contribution towards improving coverage and equity of immunisation.

2. Mandatory attachments					
No.	Strategy / Plan / Document	Attached Yes/No	Final version (dated)	Duration	Comments
	Chapter 2: Projected Coverage and Equity Improvements Chapter 3: Deployment Plan Chapter 4: Equipment Selection				
11	Maintenance Plan with financing and source(s)	Yes	July 2017		Doc # 11
12	Proof of status for CCE tariff exemptions waiver	Yes	May 2010	NA	Doc # 12
13	Terms of Reference for the relevant Coordination Forum (such as ICC) including all sections outlined in Section 5.2 of the General Application Guidelines	Yes	2000		Doc # 13
14	Minutes of the Coordination Forum meetings (ICC) from the past 12 months before the proposal	Yes	2017, 2018		3 Minutes Doc # 14
15	Coverage Evaluation Survey (CES) 2016	Yes	2016		Doc # 15
16	Other relevant documents: Operational development plan (ODP) without budget	Yes	2019-2022		Doc # 16
17	CCEOP supplementary recommended information	2	August 2018		Doc # 17
18	Standard Operating Procedures (SOP) on vaccine and cold chain management				Doc # 18
19	Concept Note :National Resource Center for Cold Chain and SNCU Equipment	1	August, 2017		Doc# 19

### 3. How do the above strategies, plans and documents inform the CCE Optimisation Platform support request (initial support and scale-up support)? (Maximum 1 page)

Countries are encouraged to reference relevant sections of the above documents as much as possible.

#### Background & Objectives:

The Government of Bangladesh is committed to achieving the universally agreed goals in specific areas including the SDG to be achieved by 2030. The goal of Bangladesh national health nutrition population sector programme (HNPS) is "To ensure that all citizens of Bangladesh enjoy health and well-being by expanding access to quality and equitable health care in a healthy and safe living environment" (Page 12-13 of HNPS). (Document # 3)

The country has set 8 strategic objectives to reach this goal. One of the strategic objectives (*Strategic Objective 7*) is "To improve equitable access to and utilization of quality health, nutrition and family planning services" which also includes immunization services (HNPS p-13). For successful

implementation of the immunization program, the government has developed several tools including comprehensive Multi-Year Plan (cMYP). (Doc# 4) In line with this, the current cMYP 2014-2018 provides a framework to plan activities to achieve important objectives of the national immunization program, as contained in the national health policy (#3-HNPSP) (cMYP, P-i). New cMYP (2018-2022) is in the final stage for approval. The present cMYP sets out the medium-term (2014-2018) strategic goals of the immunization program, the related objectives, indicators, milestones, key strategies and set out activities to meet its goal of efficient immunization service delivery, increased coverage, addressing equity challenges and programme priorities. The Expanded Programme on Immunization (EPI) for Bangladesh has a mission to deliver safe, potent, reliable and free immunization services available and accessible to all eligible children and women regardless of their ethnicity, race, religion, gender, geographical location and political affiliations.

cMYP has a target of at least 95 percent fully vaccination coverage among all under one year children at the national level and 85 percent fully vaccination coverage at each district level (cMYP, P-iv). The country national sector programme (HNPSP) also has an objective to strengthen the Immunization supply chain and management system and reduce disease prevalence by the introduction of new and underused vaccines (HNPSP, P-323). As part of this, the country has planned to introduce HPV and Rota vaccines by 2021.

### **Current status:**

According to the coverage evaluation survey, 2016 Penta3/DPT3 coverage is 90% and DHIS2 for 2016 Pentata3 coverage is 98% (administrative data). In spite of tremendous achievement in vaccination coverage, there are inequity issues in respect to rural and urban context, education of mothers and wealth quintile. Equity and gender equality have been given priority to the underserved and hard-to-reach and high-risk groups and to ensure effective use of resources following result-based principles and evidence-based practices.

The strategies for achieving the objective-6 of cMYP are specifically related to the issues of strengthening immunization services, web-based MIS system (DHIS2), web-based immunization and supply chain system integrated in DHIS2, expansion of existing cold chain and vaccine management system, developing human resource capacity, integration of temperature monitoring in DHIS2, waste management and geographic access to immunization services at all levels of the System.

To ensure the quality of the immunization supply chain management (iSC), the country conducts effective vaccines management assessment periodically. The most recent EVMA conducted in August 2014 identified some areas like inadequate cold chain capacities at all levels of supply chain, Non-PQS CCE, poor temperature monitoring, untrained human resource, data management challenges, and waste management challenges etc (Document #6-EVMA 2014).

To further identify the shortcomings in the immunization supply chain, a cold chain equipment inventory (Document #8-CCEI) was updated by collecting CCE data through DHIS2 in August 2018. The inventory 2018 recorded a total of 4,456 cold chain equipment from 64 districts and 692 service points (SP) stores in the country.

Out of the 4,456 CCE, 80% (3563) are functional currently, new not installed yet 1% (66) and the rest 19% (827) are non-functional. Out of the total CCE, 59% (2637) of the CCEs are >10 years old and the rest 41% (1819) are less than 10 years. Out of 2637 CCE >10 years old, 28% (738) are non-functional and rest 72% (1899) CCE are functional. Out of 1819 CCE < 10 years, only 5% (89) are non-functional. More than ten years equipment has higher non-functional rate. 98% (4365) of CCE use electricity as a source of energy, while only 2% (91) CCE use solar energy.

In terms of PQS status, 51% (2281) of the CCEs are non-PQS, of which 26% (in district store and 74% in service points (SP) levels.

In terms of vaccine storage capacity, Primary level stores capacity gap will be filled through HSS2 support through procurement and installation of 8 WICs of 30 m<sup>3</sup>.

Out of 64 district stores, 62 have a capacity gap at +5°C. For 29 district stores capacity requirement is meeting WIC requirement Govt of Bangladesh decided to install cold room .15 cold rooms (WICs) have already been installed in 9 districts and currently, 30 cold rooms are in process for installation at 20 districts.

The remaining 33 district stores are having a capacity gaps between 97 litres to 2,709 litres and this gap will be filled through 343 ILRs through HSS2 support.

There are 692 service points in the country, 73 of them currently have a shortage in storage capacity at +5°C and 27 have no CCE at all. The remaining 592 service points (SPs) are currently not having any capacity shortage at +5°C. However, all these 592 facilities are using obsolete, >10 years old and non-PQS CCE which need to be removed from the system to improve the vaccine storage quality. Upon removal of these obsolete CCE, 228 of these 592 facilities will develop vaccine storage capacity gap. These 592 SPs to cover a target population of 2,729,249 with quality vaccines stored in good quality CCE. 73 service points with inadequate capacity will be able to server effectively a target population of 704,975. 27 SPs were no CCE is presently available will server to a target population of 32,532 through CCEOP support.

In terms of the segmentation of service points stores (upazila, municipality and city corporation stores) with the availability of grid electricity, 98% of the service points (SP)s are connected with reliable grid electricity. All district stores (64) have reliable grid electricity.

#### **Rehabilitation of the iSCM:**

Despite a robust CCE repair & maintenance plan prevailing in the country, the breakdown of CCE is significantly high (19%) due to a large number of non-PQS and very old CCE in the supply chain system. Rehabilitation of the cold chain equipment has been started taking into account the EVMA 2014 and EVMIP 2014 recommendations, which improved few areas of the iSCM in the country. As part of this process, cold rooms have been provided to national store & district stores, remote temperature monitoring of cold rooms, continuous temperature monitoring at other districts and service points using 30 DTR, construction & renovation of district stores, procurement of refrigerators and freezers etc have been implemented so far. Gavi HSS2 and UNICEF have been supporting financial support in this rehabilitation process.

However, there are unaddressed issues like rehabilitation of the non-PQS and old CCE, vaccine transportation containers, temperature monitoring devices in district and service points store (upazila, municipality and city corporation stores, ) etc, for which funds are not yet secured. In addition to the non-PQS & old CCE, the country is shifting to cool water pack policy from the conditioned ice pack policy which will require additional ice lined refrigerators (ILR) in the supply chain system. The country's has taken decision that all cold rooms and district level ILRs will have continuous remote temperature monitoring (RTM) and monitored centrally and the rest of the ILRs in all service points will use 30DTR for continuous temperature monitoring.

Based on the unaddressed areas from the EVM-IP 2014 and CCE inventory updating 2018 and the country's strategic shift to cool water pack policy, a comprehensive CCE rehabilitation and expansion plan has been prepared by aligning with the CCE support from Gavi HSS2. According to this updated rehabilitation and expansion plan, Bangladesh requires the following CCE in the period of 2019-2022.

Store level	Gap/shortcoming	Required CCE to mitigate the gaps	Comment
National store	300m <sup>3</sup> capacity gap at +5°C and 10m <sup>3</sup> capacity gap at -20°C	22 cold rooms 40m <sup>3</sup> each and 1 freezer room of 40m <sup>3</sup>	Adjusting supply interval will reduce the number of the required cold rooms
National store	Inadequate floor space	Construction of new warehouse	
National store	Three phase voltage stabilizer	9 three phase Servo stabilizer	
District store	33 of 53 district stores have storage shortage at +5°C equal to 47,384 litres	30 cold rooms for 20 districts and 343 ILRs for the remaining 33 districts	
District store	Lack of remote temperature monitoring devices in 20 district stores with cold rooms plus 35 district stores using ILRs	20 sets of RTMD for 20 districts stores to be installed in the cold rooms, and 200 sets of RTMD systems for 35 districts using ILRs	Existing PQS and non-obsolete ILRs and new ILRs will be 989 requiring around 200 sets of RTMD
District store	Lack of generator set, three phase voltage stabilizer for district with cold rooms	20 generator system and 20 servo stabilizers	
District store	Lack of building maintenance and renovation in 32 district stores	Renovation of 32 district stores	
Service point stores	100 service points (including 1 off-grid) have shortage at +5°C equal to 14,703 (including 27 unequipped sites requiring 1,099 litres capacity). These 100 SPs also have lack in dedicated capacity for cooling water packs 60-90 litres in each site.	260 refrigerators (258 ILRs and 2 SDD fridges)	
Service point stores	228 service points (including 4 off-grid) need replacement of obsolete CCEs, and lack in dedicated capacity for cooling water packs 80-90 litres in each	532 refrigerators (518 ILRs and 14 SDD fridges)	
Service point stores	244 service points lack in dedicated capacity for cooling water packs 60-90 litres in each	244 refrigerators (ILRs)	
Service point stores	18 remaining off-grid service points lack adequate vaccine storage and water pack cooling capacity in solar technology	29 SDD fridges	
Service point stores	The current cold boxes are old and prone to breakage. All the SPs lack freeze free cold boxes	1,500 freeze free cold boxes	Each of the 692 sub-district stores and 64 districts require 2-3 cold boxes except few small urban municipal stores.
Service point stores	The current vaccine carriers are old and prone to breakage. All the SPs lack freeze free vaccine carrier	10,000 freeze free vaccine carriers	Each of the 692 sub-district stores require 15-20 vaccine carriers to conduct daily outreach sessions
Both dist. & service points	30DTRs expiring in 2018 in both district & service points	1,900 thirty DTRs in year 2019 and 1,900 thirty DTRs in year 2022	
Both dist. & service points	Required spare parts for CCEOP equipment and voltage regulator for existing CCEs	140 sets of spare parts for new CCEs and 1,600 voltage regulators for existing CCEs	
		<b>Summary of CCE need</b>	<b>Quantity</b>
		Cold room	52
		Freezer room	1
		ILR	1,363
		SDD fridges	45
		RTMD system	221
		30DTR	3,800
		Voltage regulator	1,600
		Generator	20
		Three phase voltage stabilizer	29
		Freeze free cold box	1,500
		Freezer free vaccine carrier	10,000
		Spare parts	140



A total of 1,406 ILRs and SDD fridges and 30 cold rooms are required for the entire rehabilitation of district and service point stores, of which, Gavi HSS2 is providing funding support for the 402 ILRs and other CCEs (30 cold rooms, remote temperature monitoring devices (30 set RTMD), infrastructure support for 30 district vaccine stores, electrical accessories etc.) with an amount of \$10.22 million. **Additional 1006 ILRs & SDD fridges and other CCEs are required** to complete the rehabilitation of the supply chain that will cost \$ 4,083,882 million and which is not yet secured from any other sources. Fifty percent of this amount (\$2,041,941million) is being requested from the Gavi CCEOP in this proposal.

**The expected outcome of the rehabilitation:**

This support will enable the programme to optimize the immunization supply chain in the country by improving the storage capacity and vaccine availability and thereby improve the coverage and equity. It will also improve the vaccine storage temperature monitoring system remotely and onsite and thereby augment the CCE maintenance system. The support will assist the country iSCM to redesign its entire vaccine transportation policy from conditioned ice pack to cool water pack. Vaccine transportation between stores and to outreach sites will also be improved by using freeze free passive containers.

**4. Describe how supply chain stakeholders (including Coordination Forum (ICC/HSCC or equivalent), government, NLWG, NITAG, key donors, partners, CSOs and key implementers) have been involved in the application development** including if the quorum at the endorsing meeting was met

**Does the country have a permanent and functioning National Logistics Working Group (NLWG)? If No, does the country plan to establish one and when?**

*Gavi and its Alliance partners encourage the establishment of such group that coordinates Government and non-Government partners 'activities and investments related to the health supply chain including immunization.*

**Were any of Gavi's requirements to ensure basic functionality of Coordination Forums not met? Then please describe the reasons and the approach to address this (refer to section 5.2 of the General Guidelines for the requirements) (Maximum 1 page)**

The Inter-Agency Coordination Committee (ICC) in Bangladesh is equivalent to Coordination Forum. ICC is overseeing and monitoring the immunization performance. The Inter-agency Coordination Committee (ICC) in Bangladesh is a 27- member committee consists of representation from Ministry of Health & Family Welfare, Ministry of Finance, Ministry of Local Government Rural Development and Cooperatives (LGRD&C), Ministry of Environment, UNICEF, WHO, Rotary International, Other partners and Non-government Organizations (NGOs) and Civil Society Organizations (CSO). ICC is chaired by the Secretary-Ministry of Health and Family Welfare. The ICC committee meets at least 4-6 times a year and as and when needed.

The process for the development of CCEOP application started in May 2017 when the country decided to apply and has been extensively discussed in Inter-Agency Coordination Committee (ICC) held on 09 May 2017 (Attachment Doc # 14, ICC meeting 53). All immunization stakeholders fully participated in developing this CCEOP application. The application has been developed through an intensive consultative process between the EPI authorized personnel and EPI partner agencies (WHO and UNICEF). A Core Working Committee was established for the development of the application under the leadership of the Line Director-Maternal Neonatal Child and Adolescent Health (MNC&AH), Directorate General (DG) of Health Services. Technical issues were discussed in Core Working Committee over the course of its development and endorsed by the committee.

The major issues including the application were thoroughly discussed and approved by the LCG (highest body of sector program) on 27 August 2018.

National Committee for Immunization Practices (NCIP) is also functional and overseeing the policy & technical aspects related to immunization.

National Logistics Working Group (NLWG) is not yet established in Bangladesh. Activity for formation and functioning of National Logistic Working Group (NLWG) has been kept under objective 3 in Gavi HSS3 proposal and would be formed very soon. Minutes of LCG meetings are attached.

## **PART C: SITUATION ANALYSIS AND REQUESTED SUPPORT**

This section gives an overview of the types of information the IRC will anticipate from countries in their application for CCE Optimisation Platform support. This section must be filled with appropriate reference to the country documents listed in Part B. Countries are required to provide a narrative in response to the following questions.

### **5. Situation analysis of country's supply chain and CCE (number, distribution, functionalities etc.) (Maximum 3 pages) Please respond to all questions**

**Countries are encouraged to cross reference (document title, page number) attached mandatory documents.**

*Information is required to cover the following areas:*

- a) *How is the country's immunization supply chain administered?*
- b) *What weaknesses have been identified in the country's supply chain?*
- c) *Through what interventions are these weaknesses currently being addressed?*
- d) *Describe challenges that are hindering the implementation of these interventions.*
- e) *Describe lessons learned from the recent supply chain related support that inform the current request for CCE Optimisation Platform support.*
- f) *What percentage of facilities have reliable access to grid electricity for up to or more than 8 hours per day?*
- g) *Please give the quantity and percent of current CCE that is: a) functional; b) PQS-approved; c) non-PQS-approved; and/or d) obsolete?*
- h) *What percent of the birth cohort is served by effectively functioning, PQS-approved CCE currently?*
- i) *What are the bottlenecks that CCE can address in the current supply chain set-up (for example, capacity and technology constraints)?*
- j) *Describe any other supply chain challenges that CCE Optimisation Platform support will assist in mitigating?*
- k) *What are the overall CCE needs?*

#### **a) How is the country's immunization supply chain administered?**

Bangladesh has established an inherently efficient supply chain with three tiers for supply chain system first level- national central store (Primary level-PR), second level- District vaccine store/Lowest distribution level (LD) and third level- Service delivery point level (SP) Upazila/Municipality/City corporation stores for a population of 153 million according to census 2011. In 2016 the country was home to about 3.2 million children under 1yr (i.e., 2.2% of the population) children which will reach 3.3 million in the year 2021. This 3 tier system minimize the quantity of cold chain equipment requirement, minimizes maintenance service infrastructure, minimizes transport systems dedicated to EPI and enables the country to conduct 120,000 fixed and outreach sessions per year. The maximum travel time from national HQ to furthest district

vaccine store is 12 hours, hence GOB has been investing in strengthening district level vaccine store and the transportation system from national to district store.

The government has fully functional dedicated 8 trucks for transportation of vaccines and EPI logistics. The present approach of not having sub-national store like divisional store helps country in reducing the number of CCE and its maintenance like WICs and WIFs, cold boxes and also reduces stocks of vaccines in the pipeline and multiple levels of handling. By not having an additional layer between the national and district level store, reduces the human resource requirement.

### 1. Central level stores (PR Level)

The central EPI store (PR), is located at EPI-HQ premises in Dhaka, equipped with 19 WICs (cold rooms) and 4 WIFs (freezer rooms). All cold rooms and freezer rooms are equipped with remote continuous temperature monitoring systems. The central EPI store is the primary level store receives vaccines and EPI consumables from the suppliers/ manufacturers.

Currently, the Central EPI Store directly delivers vaccines and consumables to 64 Districts (LD) on a quarterly basis (informed push system) by using cold boxes, transported by EPI owned trucks. The annual forecast of vaccines and supplies for the country is done by the Program Manager and Logistics Officer-EPI with technical assistance from UNICEF and WHO country office.

### 2. District EPI stores (LD Level)

There is 64 District (LD) stores, 9 of them are fully equipped with 15 cold rooms. 20 districts are currently being in the process for installation of 30 cold rooms. The other districts are equipped with ILRs, deep freezers, and cold boxes. Districts stores receive vaccines and consumables from the Central store on a quarterly basis along with a buffer stock of one month. Each district sends its request for vaccines and consumables to the central EPI store in Dhaka through DHIS2 tools where it is processed and supplied. The service delivery stores (SP) follow the similar process of sending and receiving the vaccine through DHIS2 and EPI consumables from the district stores on a monthly basis.

### 3. Service delivery stores-Upazila/Municipality/City Corporations (SP Level):

Service delivery stores are the service points (SP) service points also known as Upazila, municipality and city corporation which provide immunization services through fixed sessions and conduct outreach sessions in catchment areas. There are 692 service delivery points (SP), among of them 665 have cold chain stores and 27 (25 municipality and 2 zones of Narayanganj city corporation) have no cold chain stores. The average population catered by each of these service points (SP)s is about 244,000 who are covered by on an average 200 outreach session per month.

The SP stores are equipped with ILRs, icepack freezers, cold boxes and vaccine carriers. SP stores pick up vaccines and consumables from district stores (pull system) on a monthly basis with buffer stocks for 2 weeks (cMYP, page-14-15). Medical technologist EPI (MT-EPI) is responsible for handling vaccines and cold chain equipment at service delivery points.

Divisions/Areas	Storage points per supply chain level			Total
	PR (national)	LD	SP	
Dhaka	1	13	194	208
Chittagong		11	119	130
Rajshahi		8	93	101
Khulna		10	81	91
Barisal		6	50	56
Sylhet		4	41	45
Rangpur		8	74	82
Mymensingh		4	40	44
<b>Total</b>	<b>1</b>	<b>64</b>	<b>692</b>	<b>757</b>

Table: Number of Storage points by Levels

Every day, porters deliver vaccines from the Upazila Health Complex/Municipality/City Corporation to the Union/ward level vaccine distribution points where the field workers collect vaccines and deliver services in sites (outreach sessions) as per annual EPI micro plan. The vaccine carriers are used for transportation of vaccines from Upazila/Municipality/Zone level into the vaccination sites. Remaining unused vaccines are returned to the Upazila/Municipality/Zone level store in the evening, using a similar transport mechanism. Typically, an EPI outreach site where routine EPI services are provided monthly for catchments of approximately 1,000 populations.

**b) What weaknesses have been identified in the country's supply chain?**

**EVM Assessment 2014:**

EVM assessment 2014 identified key weaknesses in each of the levels of the vaccine supply chain and makes recommendations to address those weaknesses. The key weaknesses of the country iSCM (see EVMA 2014 report, page-5-10) are-

- Inadequate storage capacity for vaccines and dry goods at the central store, 63% of the 19 district stores assessed do not have sufficient capacity to store vaccines presently in the EPI schedule.
- Cold chain maintenance plans are not adequate for an efficient immunization system.
- Though EPI has dedicated vaccine-logistics trucks, often few districts travel time is more than 8 hours, there is a risk of vaccine freezing and exposure to heat.
- Many equipment are going to be more than 10 years old and not functioning optimally need to be replaced
- No functional online data management system for immunization supply chain including cold chain equipment inventory during EVM assessment. Now online CCE inventory system is established and inventory conducted in August 2018.

**CCE inventory in August 2018:**

DHIS2 of Bangladesh has online EPI supply chain system and cold chain equipment inventory is updated on a regular basis. The present inventory date is 1<sup>st</sup> August 2018. Cold chain Equipment inventory data from DHIS2 tool was exported to WHO CCEI gap analysis tool and required analysis were conducted. The inventory recorded a total of 4,456 CCE in the immunization supply chain system. The key weakness identified in the CCE inventory is-

- Out of 4,456 CCE, 80% (3563) CCE are functional, 16% are non-functional but repairable and 3% are non-functional and non-repairable making a breakdown rate 19% and 1% (66) is intact.
- 59% (2,637) of the total CCE (4,456) in the country are >10 years old.
- 28% (738) of the >10 years old CCE are non-functional, whereas only 5% (89) among the <10 Years old CCE are non-functional.
- 51% (2281) of the total CCEs (4,456) are PIS and non-PQS, of which 26% in district store and 74% are in service points (SP) levels.
- Non-functionality rate is 28% in non-PQS CCE versus 8% in PQS CCE.
- Out of 64 district stores, 33 have capacity gaps (after excluding the >10 years old CCE) at +5°C and considering all the new vaccines (Rota and HPV) to be introduced by 2019.
- Of the 692 service points (service points (SP)s) in the country, 73 of them currently having shortage in storage capacity at +5°C and 27 have no CCE. After removing the >10 years old

CCE, the gap in these 73 service points (SP)s are further increased to a total of 13,604 litres which ranges from 4 litres and 802 litres per facility.

- Of the remaining 592 service points which currently do not have any capacity shortage at +5°C, will also have shortage in 228 facilities, if >10 years CCE are removed from the system ranging from 1- 416 liters per facility.
- In addition, the non-PQS and aged CCE are prone to frequent breakdown and require costly maintenance processes in addition to ineffective cooling performance. The maintenance system is recently facing challenges like lack of training to newly appointed service point CCE handler (medical technologist-EPI/ EPI store keeper), inadequate repair & maintenance toolkits.

***c) Through what interventions are these weaknesses currently being addressed?***

The 2014 comprehensive EVM Improvement plan has categorized the infrastructure needs and priority activities and quantifies the material and resource inputs to improve and sustain the uninterrupted supply of vaccines and immunization service delivery. There are total 21 recommendations of 2014 EVM report (Page 78-85). Based on the recommendations, EPI has identified 52 activities, of which 30 activities are high, 15 are medium and 7 are low priority activities. Total 34 activities (65%) has been completely implemented (infrastructure, cold chain, temperature monitoring, cold chain logistics, management, training) and 18 activities (35%) are partially implemented. Most of the actions pending relate to preventive maintenance (E5), distribution (E7) especially the absence of freeze indicators during transportation of vaccines and foam pad use, long range vaccine carrier use, cool packs use, open vial policy and immunization session waste management (E8). Though CCEOP will support mostly to fill the cold chain capacity gap (E3), but it will also help in improving temperature monitoring (E2) at all level in addition to E7 and E8 indirectly through improvement in process and practices.

**Interventions undertaken or under process:**

Based on the EVM Assessment 2014 findings and in line with the EVMIP 2014, rehabilitation and expansion activities for the immunization supply chain began in 2015.

- 15 cold rooms (WIC) with RTMD- Beyond wireless has already been installed at 9 large districts to increase the capacity and 20 district stores are in process to augment cold chain capacity through the installation of WICs.
- Continuous temperature monitoring devices (30 DTR) has been installed in all ILRs across the country including SP level since 2016.
- Cold chain and logistics MIS integrated with DHIS2 implemented across the country in 2016 and all the cold chain equipment are part of this database and being monitored.
- EVM improvement plan is reviewed every six month and required challenges are overcome to implement the work plan.
- EVM SOPs for health workers, managers and technicians developed, disseminated and in use.
- 25 departmental engineers and technicians were provided two weeks residential course on repair, maintenance and management of cold equipment like WIC, WIF, ILR, Freezer and Voltage Stabilizer at Pune, India.

- For better Data management of immunization supply chain, immunization staffs like district EPI superintendent, Asst. Store keeper and medical technologist, EPI from upazila are trained.
- For high end equipment like WIC, WIF and temperature monitoring, government has outsourced maintenance which is supervised by departmental engineers and its fund is provided by govt.
- Three days training provided to all cold chain technicians on ILR-TCW3000AC installation and maintenance.

**d) Describe challenges that are hindering the implementation of these interventions.**

*The country has faced the following challenges during implementation of the interventions in line with the recommendation made in EVM improvement plan (cIP):*

- **Human Resource:**

- There are few vacant positions (2 CCT and 13 MT-EPI) which are critical for EPI supply chain. In addition, lack of continuous capacity building of staffs engaged in EPI supply chain affecting iSC. The situation gets worsen due to lengthy bureaucratic system of recruitment especially fill vacant posts at the service delivery points.

- **Infrastructure**

- The present national EPI store is facing space shortage to accommodate new CCE (cold rooms, freezer rooms) for expansion.
- About 3% of the service points (upazila, municipality and city corporation levels) have unreliable supply of electricity that affects the performance of CCE and immunization program.
- Lack of adequate spaces to accommodate CCE for expanding the capacity in several district stores.

- **Financial Resources:**

- Storage capacity shortage in service points stores (upazila, municipality and city corporation stores) to accommodate volume required due to new vaccine introduction need to be augmented which need additional resource.

- **Monitoring & Accountability:**

- Presently there is inadequate systemic monitoring system for iSC
- Capacity building of the line supervisor on what, how, when and frequency to monitor for iSC,
- Lack of iSCM indicators at all three levels.

**e) Describe lessons learnt from recent supply chain related support that inform the current request for CCE Optimisation Platform support.**

**The lessons learnt from the supply chain in Bangladesh in previous support are mentioned as below:**

- The limited technical skill of departmental technicians and financial resources affects post warranty CCE (WIC, WIF and Auto Main Function panel) functioning.
- Installation of newly procured CCE are challenging in terms of transportation and installation in their final sites.
- In-country spare parts availability and procurement is a challenge.

- Inadequate end user training during installation, non-availability of toolkits affects post-warranty repair, maintenance and functioning.
- Online inventory of passive cold chain equipment

**f) What percentage of facilities have reliable access to grid electricity for up to or more than 8 hours per day?**

The country has a good electric grid supply. Out of 692 service points 669 (97%) of the service points (SP)s or service points (upazila/municipality/city corporations) are connected with reliable grid electricity. Only 23 (3%) service points level (upazila) have unreliable grid electricity due to their geographical location in remote, hilly and island areas.

**g) Please give the quantity and percent of current CCE that is: a) functional; b) PQS-approved; c) non-PQS-approved; and/or d) obsolete?**

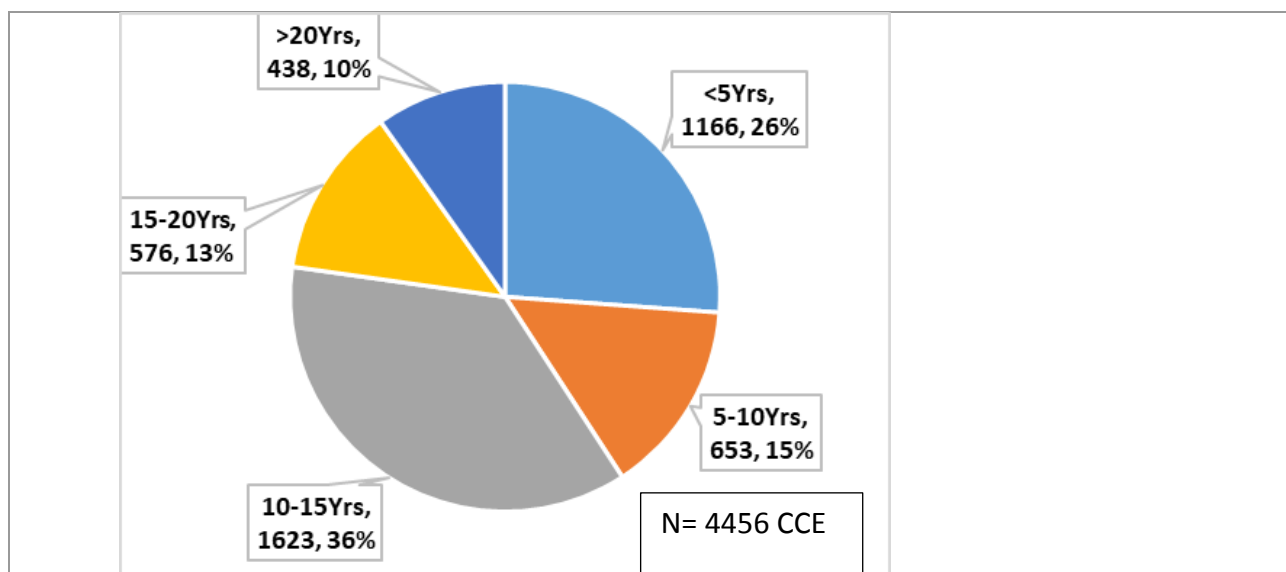
There are 4,456 ILRs, Deep Freezers and WICs. Out of these 4,456 CCE (ILRs, Deep freezers and WICs), 80% CCE are functional, 19% are non-functional (both repairable & non-repairable) and 1% (66) not yet installed.

49% of the CCEs (2,175 of 4,456) are PQS approved, of which 41% (896) is in district store and 59% (1279) in service points (SP) levels. Out of these PQS approved CCE, there are 1,802 ILRs, 358 deep freezers and 15 WICs. On the other hand, 51% of the CCEs (2,281 of 4,456) are non-PQS which is 26% (601) in district store and 74% (1680) in service points (SP) levels. Out of these non-PQS CCE there are 1447 ILRs and 834 freezers.

Through CCEOP, Bangladesh is planning to replace ILRs. There are 1434 non-PQS ILRs which are more than 10 years old and 13 ILRs which are between 5 to 10 years, in the process of implementation of CCEOP all of the non-PQS ILRs would be 10 years older. Hence EPI is planning for replace all non-PQS ILRs irrespective of their functional status. The equipment which are >10 years as on August 2018 and equipment which are between >7 to 10 years at the time of acceleration phase these will be more than 10 years old. 3% CCE are non-repairable, out of which 1.4% (64) CCE are obsolete (as per WHO tool).

The graph below showed the age distribution of PQS and non-PQS cold chain equipment.

- 438 (10%) CCE are more than 20 years, 576 (13%) are more than 15-20 years and 1623 (36%) are more than 10-15 years old
- 653 (15%) are between 5-10 years and
- 1166 (26%) are less than 5 years



**Graph 1: Age distribution of Cold Chain Equipment (CCE).**

***h) What percent of the birth cohort is served by effectively functioning, PQS-approved CCE currently?***

There are 1,995 functioning PQS CCE, represents 45% of the total of 4,456 CCE in different health facilities across the country. These CCE provide services to 55% of the annual birth cohort of 3.4 million.

Note: 1634 non-PQS functioning CCE represents 37%, provide 45% of the annual birth cohort of 3.4 million.

***i) What are the bottlenecks that CCE can address in the current supply chain set-up (for example, capacity and technology constraints)?***

- Non-functionality is 28% among the non-PQS equipment. Repair and maintenance of these equipment are challenging and costly, hence require gradual replacement.
- Removing non-PQS & >10 Years old CCE will bring significant storage capacity shortage in district and service points which will scale up due to introduction of new vaccines (Rota and HPV) in 2019. CCEOP supported cold chain equipment will increase the vaccine storage capacity and quality in these contexts. Replacement of obsolete technology would also facilitate easy and cost effective maintenance, repair, and availability of spare parts.
- Country's strategic shift from conditioned ice pack to cool water pack policy is facing shortage of adequate number of ILRs at service points, which CCEOP can leverage. Country has planned to have 2 ILRs at each SP. One dedicated ILR only for keeping vaccines and one dedicated ILR for preparing cool water packs.
- CCEOP supported temperature monitoring devices will enable the programme to establish a CTM systems at all levels through using RTMD at national and district level vaccine stores and 30 DTR in all service delivery points all over the country. CTM system for CCE will help in identifying equipment those require repair before actual breakdown.
- After introduction of these CCEOP equipment the required cold chain capacity will also be sufficient to accommodate SIA vaccines (MR, JE etc).



**j) Describe any other supply chain challenges that CCE Optimisation Platform support will assist in mitigating?**

In addition to replacement of old equipment, CCEOP will be supporting for

- Cut down electricity consumption and cost paid by government
- Preventive and corrective maintenance volume and cost will be reduced by reducing the number of model presently from 23 to 4 through CCEOP support
- Positive environmental effect will be ensured through CCEOP eligible equipment
- Capacity development cost of the cold chain technicians will be reduced
- Establishing an effective maintenance structure for planning and implementation
- Variety of data of cold chain equipment will be reduced which will facilitate better data quality
- Institutionalizing an effective temperature monitoring system at all levels of iSCM for vaccine quality assurance and advance alert of equipment that is going to have breakdown.
- Training of the CCE handlers on preventive maintenance as part of the service bundle will help better cold chain equipment handling and maintenances.

**k) What are the overall CCE needs?**

Having analysed the updated cold chain inventory in August 2018 and taken into consideration of the available storage capacity and required capacity for current and new vaccine introduction, the number of facilities with unreliable grid electricity, the required dedicated capacity for cooling water packs, the age of equipment, number of existing PQS and non-PQS equipment and country policy & priorities. Total of 1408 (1006 ILRs and SDD through CCEOP and 402 ILRs through Gavi HSS2) CCE and other logistics are required to complete the rehabilitation and expansion of the entire immunization supply chain in the country in addition to the ongoing Gavi HSS2 support. The table below shows the overall CCE needs which are being requested from the Gavi CCEOP platform-

Cold Chain Equipment and other support required for rehabilitation and expansion of the Bangladesh immunization supply chain 2019-2022								
Item	Quantity required	# in year 2019	# in year 2020	# in year 2021	# in year 2022	Total cost/ budget (\$)	Source of funding	Remarks
ILR Vestfrost VLS400A (for service points)	156	40	116			253,369	CCEOP	Total need: 1,408 fridges, 402 are being procured from Gavi HSS2. These 402 will be deployed in 33 districts and few service points
ILR Vestfrost VLS300A (for service points)	805	159	402	244		1,142,456	CCEOP	
SDD refrigerator Dometic TCW40SDD (for service points)	45	31	14			341,694	CCEOP	
Sets of spare parts for existing and CCEOP equipment	140	40		100		294,000	CCEOP	
Freeze free cold box	1,500	300	400	400	400	600,000	CCEOP	
Freeze free vaccine carrier	10,000	1,000	3,000	3,000	3,000	600,000	CCEOP	
Voltage stabilizer for existing CCE	1,600	600	1,000			288,000	CCEOP	
Fridge tag2 /30 DTR for existing CCE	3,800	1,900			1,900	167,200	CCEOP	
RTMD Cold Trace5 for district cold stores	200	100	100			166,000	CCEOP	21 more from HSS2
<b>CCEOP total</b>						<b>3,852,719</b>	<b>CCEOP</b>	
<b>CCEOP Total including the 6% additional buffer</b>						<b>4,083,882</b>		

**The total fund required for these CCE support is \$ 4,083,882. Bangladesh needs to co-fund 50%, hence, \$ 2,041,941 is requested for funding from CCEOP.**

**6. Expected immunisation coverage, equity and sustainability results (Maximum 2 pages) Please respond to all questions**

**Countries are encouraged to cross reference (document title, page number) attached mandatory documents.**

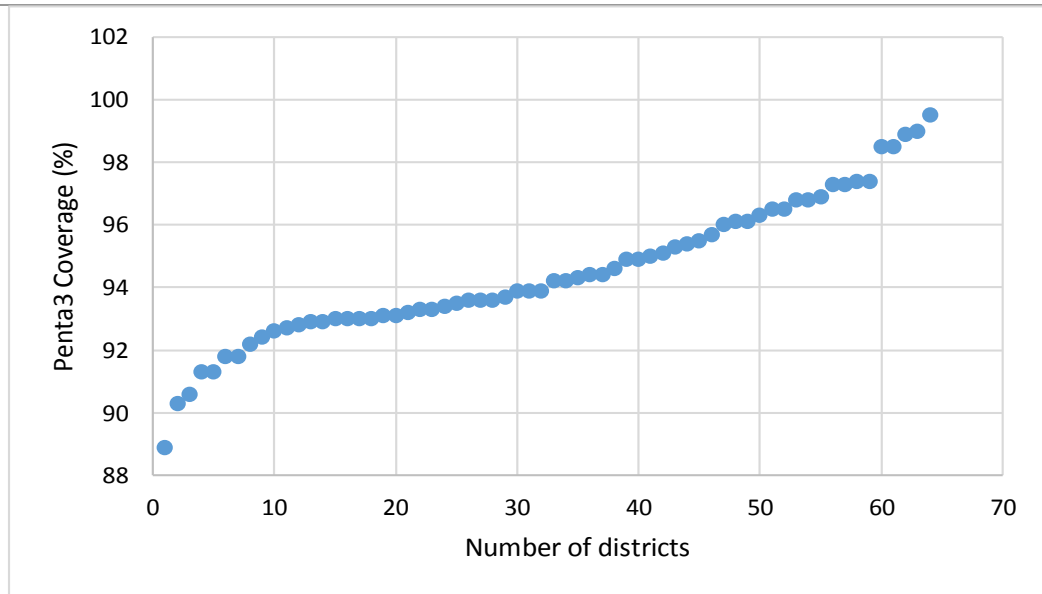
*Information is required to cover the following areas:*

- a) *How will the requested Platform support concretely contribute to addressing identified geographic and socio-economic inequities and gender barriers to sustainable improvements in coverage and equity of immunisation? Examples may include (not exhaustive):*
  - o *Geographically remote districts or those with low coverage*
  - o *Poorer communities (e.g. in the poorest 10% of the population)*
  - o *Communities where gender barriers are significant and/or where low levels of female education is common (as this is often associated with lower coverage)*
- b) *What analyses have been made, or what plans are underway, to optimise the design of the supply chain distribution system in order to improve the efficiency of the supply chain and contribute to achieving coverage and equity goals?*
- c) *How have these system design considerations impacted the choice of CCE to be supported by the Platform?*
- d) *Concretely, how will Platform support help improve the sustainability of the supply chain system?*

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  - ***Geographically remote districts or those with low coverage***
  - ***Poorer communities (e.g. in the poorest 10% of the population)***
  - ***Communities where gender barriers are significant and/or where low levels of female education is common (as this is often associated with lower coverage)***

In 2016, the EPI Coverage Evaluation Survey (CES) indicated that Bangladesh had achieved 82.3 per cent Fully Vaccinated Child coverage and comparing this coverage with the target population in the country, there are a total of 5,60,000 partially vaccinated or unimmunized children in the country. As per the Coverage Evaluation Survey 2015 there is some inequities in vaccination across different geographic divisions, city corporations and districts. Penta3 coverage is 90.6% in rural vs 87.7% in urban areas. The fully immunized children coverage showed that 82.5% is male and 82.2% is female. Likewise, the FVC is 83.5% in rural vs 77.1 in urban areas. The above statistics indicates that there are some inequity issues in respect rural and urban context as well as in the gender context.

According to EPI CES 2016, national Penta3 average coverage is 90% which also shows notable geographical differences (districts). The district coverage ranges between 82% to 97%. Out of 64 districts and 11 city corporation, 22 districts and 9 city corporations have penta3 coverage less than the national average valid vaccination coverage by age of 12 months by district and city corporation ( CES 2016, page 239). See graph below.



**Graph 2: Number of districts with Penta3 coverage**

Socio-economic inequity of coverage: Penta3 coverage is 87% among children of illiterate mother versus 93% children’ mothers who completed secondary school. Fully Immunized Children is 81.6% in the lowest wealth quintile; 84% in middle quintile and 80.4% in the highest quintile. (Source: Bangladesh EPI CES 2016).

Few districts in coastal areas, and districts with urban slums, poor socio economic conditions also have low immunization coverages. Usage of obsolete CCE technology is an additional challenge for these districts due to frequent breakdown, repair and lack of spare parts.

Considering the coverage and the number of unimmunized children for these 30 districts and 9 city corporations, CCEOP supported CCE are planned to support the improvement of 30 districts and 9 city corporations. The provision of replacement of obsolete technology CCE and expansion of CCE will improve the vaccine storage, transport and delivery quality and contribute to equitable immunization coverage.

**b) What analyses have been made, or what plans are underway, to optimise the design of the supply chain distribution system in order to improve the efficiency of the supply chain and contribute to achieving coverage and equity goals?**

In the CCE inventory August 2018, EPI has considered all the issues including coverage and equity and cold chain gap analysis. Country has also done coverage and equity analysis from the CES 2015 and found minimum equity gap in terms of wealth quantile and rural-Urban.

*Table: Percentage distribution of children who received all valid vaccine by age of 12 months by background characteristics:*

Valid Coverage; Source CES 2016					
Sex	BCG	Penta1	Penta3	MR	FVC
Male	99.6	97.8	90.0	87.5	82.2
Female	99.4	97.7	90.2	87.5	82.5
Residence					
Rural	99.5	97.9	90.6	88.5	83.5
Urban	99.5	97.4	87.7	82.5	77.1

<b>Education of mothers</b>					
Illiterate	98.1	96.1	87.3	81.0	76.0
Primary	99.4	97.4	89.0	85.3	80.2
Secondary	99.7	98.1	91.2	89.0	84.2
Degree	100	98.4	90.8	91.1	84.6
<b>Wealth Quintiles</b>					
Poorest	99.2	97.2	89.4	86.8	81.6
Middle	99.6	97.7	90.5	89.1	84.0
Richest	99.6	97.9	88.6	86.6	80.4
<b>Hard to reach area</b>					
Yes	99.5	97.9	89.2	87.7	81.9
No	99.5	97.8	90.2	87.5	82.5
<b>National</b>	<b>99.5</b>	<b>97.8</b>	<b>90.1</b>	<b>87.5</b>	<b>82.3</b>

In the context of relatively higher immunization coverage in majority districts, the country has low level of inequity of coverage in terms of socio-economic and gender parameters. On the other hand, the immunization supply chain is burdened by large number of obsolete and non-PQS CCE. Overall, 59% of the CCE in the country is >10 years old, while, 28% of the >10 years old CCE are non-functional which is only 5% among the <10 Years old CCE. The CCE rehabilitation and expansion plan 2019-22 will replace this equipment in phases as well as will expand the capacity of storage in the background of new vaccine introduction. CCEOP support will augment this rehabilitation procedure to sustain the high immunization coverage. There is no need for any further changes in the iSC since it is already neat and optimized.

Also, web based data management system (DHIS2) has been fully functional and includes vaccine stock management, logistics data along with CCE inventory are being monitored since 2015. Country has already implemented use of RTMD in all WICs (national and selected districts) and 30DTRs in all ILRs (LDs and SPs) and is planning to integrate temperature monitoring data with the DHIS2 through an application programming interface (API) to monitor vaccine storage temperature from all levels of the supply chain. This will enable the programme to ensure high quality vaccine for all children in the country irrespective of geographical and socio-economic differences.

Bangladesh decision to shift from conditioned ice pack to cool water pack policy requires more number of ILRs at service points. Country has planned to have 2 ILRs at each SP. One dedicated ILR only for keeping vaccines and one dedicated ILR for preparing cool water packs.

**c) How have these system design considerations impacted the choice of CCE to be supported by the Platform?**

Bangladesh EPI supply chain system is having 3 tier EPI supply chain system which is helping the country for efficiently managing vaccine storage, transportation and distribution without huge amount of vaccine in the pipeline. In the past few stock outs which had happened is linked to delay procurement and not due to vaccine management from central store to LD and SPs. We consider 3-tier supply chain system is functioning efficiently and this has been strengthened further after EPI supply chain system managed on line through integration with DHIS2 tool throughout the country at all levels. However, government is considering to change three month supply schedule to two month supply schedule for the districts (LDs). In the iSCM redesign of shifting to cool water pack policy, the CCEOP supported equipment will play a critical role in building the capacity to

prepare cool water packs at service points. 23 service points currently having unreliable electricity will be equipped with appropriate solar direct drive equipment.

27 service points comprising 2 zones of city corporation and 25 municipality currently have no CCE and conducting immunization session by only outreach sessions by collecting vaccines from the neighbouring service points since they have dedicated human resources for cold chain handling and immunization service deliveries. In the absence of coverage evaluation survey in the municipality areas, the reported coverage is used for planning and monitoring. The reported Penta3 coverage in some of these 27 service points is low (65%). Establishment of dedicated cold chain stores in these facilities through CCEOP application will improve the vaccine availability and quality. This will help in conducting regular static immunization sessions as well as to increase the number of outreach sessions to cover the unreached children.

**d) Concretely, how will Platform support help improve the sustainability of the supply chain system?**

Having achieved high coverage of the routine immunizations, Bangladesh is aiming to sustain its FIC coverage to 95% irrespective of the geographical and other socio-economic differences in line with the cMYP objectives (detailed ref.).

CCEOP supported newer, PQS, and higher functioning cold chain equipment will replace obsolete technology with training of staff. CCEOP will help in easy and cost effective maintenance and repair with availability of spare parts.

The CCEOP support will enable the country iSCM with higher cold chain capacity and quality of vaccine storage and distribution at LDs and SPs. This will help in introduction of new vaccines. In addition to that, CCEOP will help in reliable storage, transportation and distribution of vaccines through the existing temperature monitoring system, which will be further, strengthened. Overall, the CCEOP support will improve the availability and quality of vaccines at all levels of the supply chain in the country and will also help in improving quality coverage and protection of the children.

**7. Maintenance plan (and its source of funding) and equipment disposal (Maximum 2 pages)**

*Please respond to all questions*

**Countries are encouraged to cross reference (document title, page number) attached mandatory documents.**

*Information is required to cover the following areas:*

- a) *How will the country ensure that aspects of maintaining the cold chain are addressed (e.g. preventive and corrective maintenance, monitoring functionality, technicians, financing for maintenance, etc.)?*
  - o *What is the frequency of preventative and corrective maintenance that the country commits to (supported by partners)?*
  - o *What technical support is anticipated for maintenance?*
- b) *How will the country monitor the completion of preventive and corrective maintenance?*
  - o *Which source(s) of funding will be used for maintenance, and to what extent are they assured?*
- c) *How will the country dispose of obsolete and irreparable equipment replaced by CCE Optimisation Platform equipment?*

- a) ***How will the country ensure that aspects of maintaining the cold chain are addressed (e.g. preventive and corrective maintenance, monitoring functionality, technicians, financing for maintenance, etc.)?***

Historically, Bangladesh has a good maintenance system comprising of cold chain Engineers, Sub-Assistant Engineers, Cold Chain Technicians (CCT) and Medical Technologists-EPI/Store in-charge (MT-EPI) at national (PR), all district levels (LD) and Service points (SP) level (SPs) who are full time Ministry of Health employee. Bangladesh, cold chain maintenance policy has been discussed in earlier chapter (chapter 5 and 6). As per this policy preventive and corrective maintenance is very well discussed and segregated. At district level, out of the 64 districts, 62 have dedicated cold chain technicians (CCT) who are adequately trained to handle the CCE. However, they need to equip with appropriate new toolkits, spare parts. They have full time transport (motorbike) to conduct onsite preventive and corrective maintenance of CCE at district stores and service points (SP) stores (SPs). As per the recommendation in the EVM report 2014 and the comprehensive improvement plan (cIP) 2014, Bangladesh EPI has updated the Cold Chain Equipment Repair & maintenance plan 2019-22 (Doc # 11).

### **Preventive Maintenance of CCE:**

All preventive maintenance of WICs and WIFs throughout the country are out sourced to the selected agency and supervised by the departmental technicians and officials. The cold chain engineers located in central stores are responsible for central and districts through remote temperature monitoring devices (RTMD). Based on the temperature monitoring report the functionality of the equipment is assessed and required coordination with outsourced agency.

Preventive maintenance of ILRs, DF and CB undergo regular maintenance check by the departmental technicians in each district. They use weekly, fortnightly, monthly, and yearly schedule/ checklist for the regular maintenance as per SOP. The official of EPI section regularly review these reports. In addition to central review of the documents, these documents also referred during field visit. There are dedicated vaccine and cold chain handlers (Medical Technologist-EPI/ EPI store in-charge) at service points (SP) levels (SPs) for preventative maintenance of cold chain equipment (ILRs and Deep Freezers) and monitoring of temperature under the supervision of the district CCT.

Preventive maintenance like defrosting is conducted on a monthly basis or frost is more than 5 mm (0.20 inch) thick on the walls or even 1 mm thick on the top area at district and service points (SP) levels stores then the unit requires to be defrosted as per the SOPs developed in the country on preventive maintenance. Also please find the SOP for cold chain equipment maintenance (doc # 18), Preventative maintenance services are also documented through online DHIS2 tools.

### **Corrective maintenance:**

Corrective maintenance of all WICs and WIFs at central level is outsourced with government fund and performing well since 2016 (implemented as a recommendation in EVM IP, 2014). UNICEF provides fund for spares including maintenance of central temperature monitoring using RTM devices. The outsourced agency staffs are generally well trained, motivated and reliable. The cold chain engineers located in central stores liaise and monitor the maintenance activities done by the outsourced agency.

The corrective maintenance for ILRs and DFs is conducted onsite by departmental technicians (CCT) both for minor and major repairs on the site (district and service points (SP) level).

However, major repair for which spares are not available within the department are taken to private workshop for quick repair and paid as per government policy.

Maintenance reporting is incorporated in DHIS2 which is real time and being monitored from higher levels including the national levels which enabled national EPI to triggers corrective maintenance to lower level stores.

The spare parts required for maintenance is procured by both UNICEF and government. Spare parts which are not locally available are procured by UNICEF and MOH procure spares like copper tube, refrigerant, circuit breaker, plug and fuses etc. Government allocates resources for spares and accessories for CCE as part of the yearly budget. Twenty technician's capacity has been built by UNICEF through 12 days residential training on ILRs, Deep freezers, WICs, WIFs and solar equipment and generators at NCCRC Pune, India.

Cold chain technicians and sub-assistant engineers both are central and district level are managing with toolkits more than 20 years and need immediate replacement of this toolkit, which will enhance their capacity to efficiently undertake regular maintenance of CCEs.

Government of Bangladesh is working closely with UNICEF since October 2017 after the joint appraisal visit by Gavi and alliance partners to establish a national cold chain equipment training centre at Dhaka (Doc#19) to have a national workshop and continuous capacity building for CCTs . Presently international experts has been hired and facilities assessment is going on to identify to host the training centre.

Bangladesh CCE maintenance model (Doc.# 11; Bangladesh CCE repair and maintenance plan, Table number 1, page-8)

Level of supply Chain	Trigger for Service	Focal person	Method of Service	Funding
Central Store (PR)	Alarm from CTM, Visual inspection	Cold Chain Engineer, Supervision: Program Manager	Cold Chain Engineer, Sub-Assistant Engineer, Cold Chain Technician provide at site direct service, and Maintenance Contractor engaged on yearly basis for corrective and preventive maintenance.	EPI HQ
District Store (LD)	Fridge Tag, Visual Inspection	Cold Chain Technician, Supervision: Civil Surgeon	Cold Chain Technician provides hands on service. Sends equipment to local workshop for any major repair.	EPI HQ
Upazila Store (SP)	Fridge Tag, Visual Inspection	Medical Technologist EPI, Supervisor :Upazila Health & Family Planning Officer	Medical Technologist conducts Preventive Maintenance, for any issue beyondd his skill refers to District Cold Chain Technician.	EPI HQ, Through Civil Surgeon

**b) How will the country monitor the completion of preventive and corrective maintenance? Which source(s) of funding will be used for maintenance, and to what extent are they assured?**

As mentioned earlier sections that GOB has clear policy for both preventive and corrective maintenance with adequate annual fund allocation for CCE maintenance. The current CCE maintenance system is performing well with few limitations due to unavailability of spare parts in country and toolkits. MOH gets support from UNICEF for offshore procurement of spare parts not available in the country. Through the CCEOP proposal country would like to procure spare parts. But toolkits will be procured through HSS2 fund those will be helpful in sustainability of regular repair and maintenance. Majority of cold chain maintenance both preventive and corrective are now monitored through online system DHIS2 initiated since 2016.

The maintenance system (staff salary, transportation, toolkits, spare parts) is funded by the MOH which is incorporated in yearly operation budget, although the process of fund allocation for spare parts and off-site maintenance cost is somewhat lengthy. Gavi HSS2 and UNICEF also provide support for the spare parts and training.

Country has already initiated the plan to establish a National Cold Chain Training Centre, which will enhance the capacity of 72 Cold Chain Technicians available in the Country on regular basis. This will ensure sustainability of capacity building of CCTs on Cold Chain Equipment repair and maintenance in addition; this will also benefit Country for having a sustainable Preventive and Corrective maintenance system. ROSA is planning to organize a regional workshop of all Cold Chain Equipment manufacturers of South East Asia countries in November 2018 to build the capacity of these manufacturers on PQS (Performance, Quality and Safety Standards) and also mapping the availability of various spare parts within the region, Bangladesh will be immensely benefited from this workshop. Since there are weekly, fortnightly, monthly, quarterly reporting template for equipment repair and maintenance, this ensures monitoring system for Cold Chain across the country.

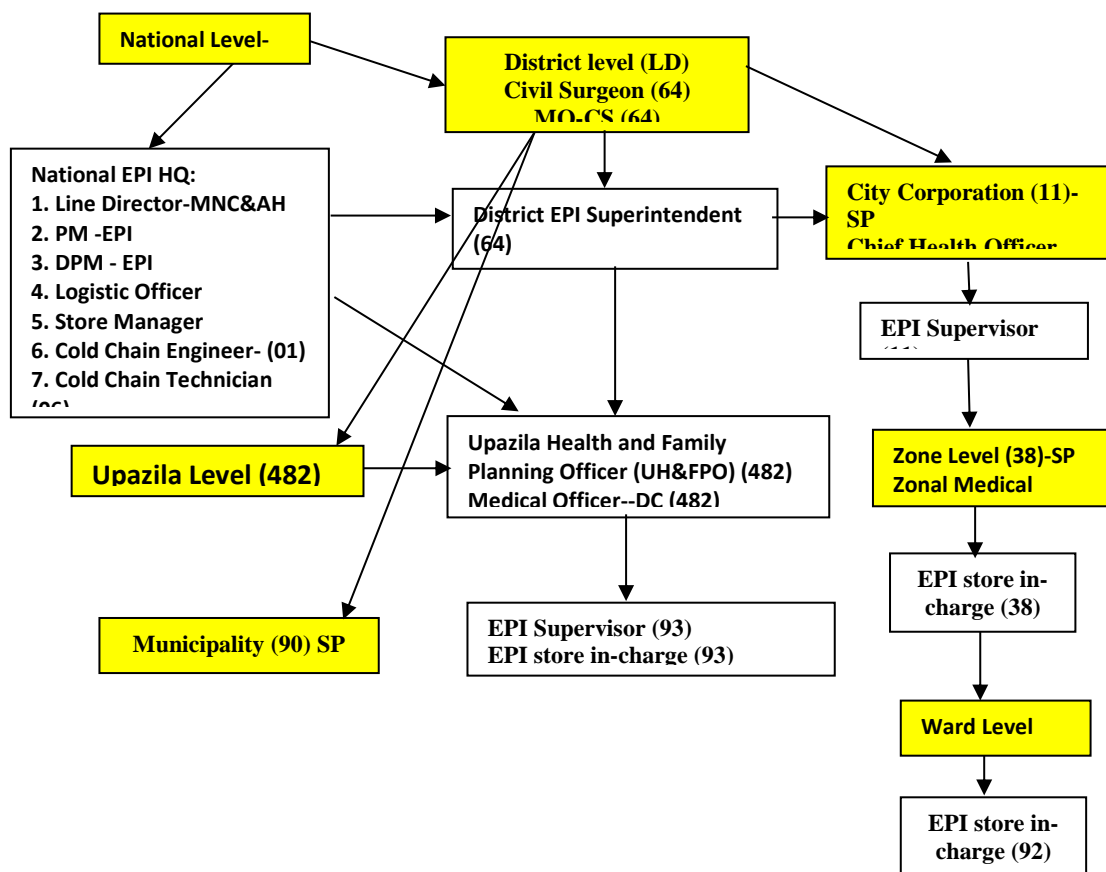
All CCE those will be procured through CCEOP support will be inventoried first and then it will be considered for regular preventive and corrective maintenance like existing CCE. Since Country has a very good temperature monitoring system across the country several maintenance issues are identified before actual breakdown has happened. Temperature monitoring helps in triggering corrective maintenance. (Bangladesh CCE repair and maintenance plan, Doc # 11).

The CCEOP supported equipment are with modern Technology, it will have less incidence of breakdown and will reduce incidence of corrective maintenance significantly. Moreover, the user training bundled in the installation package of the platform supported CCE will enable the remaining gap in preventive maintenance training of the MT EPI at service points (SP) levels. In addition to that, the already functioning DHIS2 is capable of monitoring the performance of the existing as well as the newly supplied CCE effectively. Due to adequate presence of Cold Chain Technician, Medical Technologist and Cold Chain handlers' information flow for CCE is very efficient and appropriate action is taken quickly as mentioned below.



Reporting System for Cold Chain: Any equipment which is either not maintaining temperature or not working is reported within 24 hours to the district Cold Chain Technicians who subsequently make a visit to the site within 24 hours or next working day and undertake required repair and maintenance. If CCT cannot correct the machine due to lack of spare parts and tool, then approval is needed from the district Civil Surgeon for getting it repaired from private workshop. In majority of such cases, the equipment is fixed through the support of private workshops and the district Civil Surgeon pay the vendor or agency.

### Organogram of EPI cold chain system



### Maintenance information system- *Feedback and action*



**c) How will the country dispose of obsolete and irreparable equipment replaced by CCE Optimisation Platform equipment?**

The country is already following a system of disposing of the obsolete and irreparable CCE after recovering functional spares that could be used to maintain existing CCE. The country has a condemnation board at national and sub-national level which follow the environment friendly procedure to ensure the best practises at the time of disposing the equipment. For equipment, whose parts could not be used as spares, the government policies for such procedures (auctioning) would be followed. A three members committee established within MOH&FW reconfirms the equipment functionality. Once the committee verifies that the equipment is irreparable, it is then disposed of by the condemnation board.

GOB has also improved the mechanism of disposal of CCE by using global decommissioning guideline available in “Decommissioning and Safe Disposal of Cold Chain Equipment” published by WHO and UNICEF available at <https://www.technet-21.org/library/main/4883>.

MOH will consider outsourcing of the hazardous refrigerant disposal/recovery process with the involvement of expert private agencies.

**8. Other implementation details (Maximum 1 page) Please respond to all questions**

**Countries are encouraged to cross reference (document title, page number) attached mandatory documents.**

*Information is required to cover the following areas:*

- a) *How will the country facilitate the manufacturer’s or representative’s role in equipment purchase, distribution and installation?*
- b) *What is the source of the joint investment? Is the country’s joint investment secured?*
- c) *Has the country secured import tariff exemptions for CCE? If yes, attach proof.*

Bangladesh has preferred to rationalize its CCE by selecting few models in order to facilitate management, training of users, monitoring and maintenance. Bangladesh agrees to CCEOP recommendations to engage UNICEF supply division to deal with the supplier for all the procurement and deployment of the new equipment. The country will liaise through the UNICEF country office with the SD to communicate with the manufacturers on custom clearances, warehousing, transportation, installation and user training. The national and district cold chain engineers/technician teams shall work with the manufacturer’s representative in ensuring that CCE are installed at the appropriate locations.

The operation deployment plan will be provided to Gavi and to the supplier’s representatives to facilitate the installation as planned. Any revision in the operation deployment plan will be communicated with the respective parties for seamless installation process in the country.


The country will be responsible for providing supportive environment for the supplier representative to complete the installation. The EPI will tag its technicians/personnel with the supplier representatives to assist the process of installation.


Bangladesh has on-going HSS2 grant of 34 million USD and as per the guidance note of the CCEOP, the country will provide the co-funding amount (\$ 2,041,941) from the Gavi HSS2 allocation. The country has planned to procure 70 tool kits for regional stores and national training centre and the estimated cost is 2000 USD for each (70 x 2000)= 140000 USD from Gavi HSS2 fund.

The country has standing import tariff exemption for the vaccines, CCE, and other consumables in concurrence jointly with the Gavi, ministry of health and ministry of finance (Doc # 12).

## PART D: INITIAL SUPPORT PHASE

This **initial support phase** (through years 1 and 2) is designed to address urgent CCE needs contributing to improvements in coverage and equity, to protect vaccine stocks, complement investments in other supply chain 'fundamentals' and contribute to full scale-up of optimised, sustainable supply chains.

	Budgets are <b>not inclusive</b> of operational cost. Operational costs must be financed by Ministry of Health or other partners.
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	Further information on CCE rehabilitation and expansion plan, equipment selection and strategic deployment plan requirements is provided in Annex 3 of the CCE Optimisation Platform Guidelines, available at <a href="http://www.gavi.org/support/apply/">www.gavi.org/support/apply/</a>
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### 9. Prioritised (Urgent) CCE needs (Maximum 3 pages)

Provide information on **2 to 4 prioritised (urgent) CCE needs** as identified in the 'CCE rehabilitation and expansion plan, equipment selection and strategic deployment plan requirements'.

For each prioritised (urgent) CCE need, please provide the following information:

1. **The need:** Type of activity (e.g. replace obsolete CCE, extend CCE to unequipped facilities, etc.); specific CCE site (facility); type of equipment required; quantity of equipment items.
2. **Justification:** Reasons for urgent need (e.g. low CCE and/or immunisation (Penta3) coverage area, gender barriers, mobile population, etc.); current CCE and immunisation (Penta3) coverage in the population area.
3. **Expected outcome:** Anticipated increase in CCE and immunisation coverage (Penta3); anticipated progress against identified inequity (describe, in alignment with country Performance framework).
4. **Total CCE budget:** includes Gavi and country joint investment share

#### Prioritised (Urgent) CCE Need #1 (Year 2019)

The need	CCE model	Number of CCE
	Vestfrost VLS400A (ILR)	40
Vestfrost VLS300A (ILR)	159	
B Medical Systems Sarl (Dometic) (TCW 3043 SDD)	31	
Freeze free cold box	300	
Freeze free vaccine carrier	1,000	
Fridge Tag2	1,900	
Voltage stabilizer for existing fridges	600	
Spare part set	40	
RTMD (Cold Trace 5)	100	
<b>Total refrigerators &amp; freezers</b>	<b>230 (ILRs &amp; SDDs only)</b>	
<b>Justification</b>	118 service points has been identified which need expansion, extension and replacement. Out of these 118 service points, 73 need expansion and 27 SPs	

	<p>will be extension and 18 need replacement for EPI service. Out of the 73 service points for expansion, 72 on-grid facility and 1 is off-grid facility.</p> <p>55 ILRs will be used for extension of 27 SPs. 144 ILRs and 2 SDDs will be used for expansion of 73 SPs. 29 SDDs will be used for replacement of the 18 off-grid facilities since their electric CCEs are not fully functioning. Most of these facilities are mainly from the low performing districts as well as with inequity in immunization coverage.</p>																		
<b>Expected outcome</b>	Vaccine storage capacity increased for current schedule as well as for Rota and HPV introduction. New sites will have cold chain store to start static sessions and increase outreach sessions. Dedicated capacity will be available in these facilities for cooling water packs to shift to cool water pack policy.																		
<b>Total CCE budget</b>	<b>\$ 1,128,485</b>																		
<b>Prioritised (Urgent) CCE Need #2 (Year 2020)</b>																			
<b>The need</b>	<table border="1"> <thead> <tr> <th>CCE model</th> <th>Number of CCE</th> </tr> </thead> <tbody> <tr> <td>Vestfrost VLS400A (ILR)</td> <td>116</td> </tr> <tr> <td>Vestfrost VLS300A (ILR)</td> <td>402</td> </tr> <tr> <td>B Medical Systems Sarl (Dometic) (TCW 3043 SDD)</td> <td>14</td> </tr> <tr> <td>Freeze free cold box</td> <td>400</td> </tr> <tr> <td>Freeze free vaccine carrier</td> <td>3000</td> </tr> <tr> <td>Voltage stabilizer for existing fridges</td> <td>1000</td> </tr> <tr> <td>RTMD (Cold Trace 5)</td> <td>100</td> </tr> <tr> <td><b>Total refrigerators &amp; freezers</b></td> <td><b>532 (ILRs &amp; SDD only)</b></td> </tr> </tbody> </table>	CCE model	Number of CCE	Vestfrost VLS400A (ILR)	116	Vestfrost VLS300A (ILR)	402	B Medical Systems Sarl (Dometic) (TCW 3043 SDD)	14	Freeze free cold box	400	Freeze free vaccine carrier	3000	Voltage stabilizer for existing fridges	1000	RTMD (Cold Trace 5)	100	<b>Total refrigerators &amp; freezers</b>	<b>532 (ILRs &amp; SDD only)</b>
CCE model	Number of CCE																		
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Freeze free vaccine carrier	3000																		
Voltage stabilizer for existing fridges	1000																		
RTMD (Cold Trace 5)	100																		
<b>Total refrigerators &amp; freezers</b>	<b>532 (ILRs &amp; SDD only)</b>																		
<b>Justification</b>	518 ILRs & 14 SDD refrigerators for replacement/expansion of 228 service points (including 4 off-grid sites) that require urgent replacement of non-PQS and >10 years old CCE. Most of these facilities are mainly from the low performing and geographically difficult areas as well as with inequity in immunization coverage. 4 facilities currently using a mix of electric and solar CCE and the electric CCE are not functioning properly due to unreliable grid electricity.																		
<b>Expected outcome</b>	Vaccine storage capacity and quality will be improved as well as effective vaccine management ensured. Transition to cool water pack policy will be enabled in part of the service points.																		
<b>Total CCE budget</b>	<b>\$ 1,556,319</b>																		
<b>Prioritised (Urgent) CCE Need #3</b>																			
<b>The need</b>																			
<b>Justification</b>																			
<b>Expected outcome</b>																			
<b>Total CCE budget</b>																			
<b>Prioritised (Urgent) CCE Need #4</b>																			
<b>The need</b>																			
<b>Justification</b>																			
<b>Expected outcome</b>																			
<b>Total CCE budget</b>																			
<b>GRAND TOTAL CCE BUDGET: Initial support (Years 1 and 2 )</b>	<b>\$ 2,684,804</b>																		

**10. Summary of INITIAL SUPPORT PHASE replacement/rehabilitation, expansion and extension plan**

*All countries must fill this section to highlight the number of equipment and corresponding number of sites these equipment will serve to meet their replacement/rehabilitation, expansion and extension targets. See Section 6.2 of the CCE optimisation Platform Guidelines for the definitions of replacement/rehabilitation, expansion and extension. The values entered below must align with those in Section 9 above and in other parts of the application form.*

Replacement/Rehabilitation				Expansion		Extension	
Existing sites with (non)functional and/or obsolete non-PQS equipment to be replaced with platform-eligible ILR, SDD or long-term passive devices (including equipping sites with a larger equipment)		Existing sites with (non)functional and/or obsolete PQS equipment to be replaced with platform-eligible ILR, SDD or long-term passive devices (including equipping sites with a larger equipment)		Equipping existing sites with ADDITIONAL pieces of equipment for new vaccine introduction and/or to serve an increasing population		Equipping previously unequipped sites (providing immunisation services or not, including existing sites without active devices) and add new service sites	
<i>No of Equipment</i>	<i>No of sites</i>	<i>No of Equipment</i>	<i>No of sites</i>	<i>No of Equipment</i>	<i>No of sites</i>	<i>No of Equipment</i>	<i>No of sites</i>
		ILR 518	224	ILR 144	72	ILR 55	27
		SDD 43	22	SDD 2	1		

**402 ILRs will also come from Gavi HSS2 during 2019-20 which will cover part of expansion of 58 service points and entire expansion of 33 district stores (kindly refer to doc# 8.6, worksheet HSS-CCEOP alignment for details of CCE procured through HSS2).**

## 11. Ongoing or planned activities around other supply chain fundamentals in the initial support phase

*In this section, linkages must be drawn between requested CCE Optimisation Platform support, on-going Gavi investments (especially through the Health Systems Strengthening support) and other partner supply chain support.*

*Describe planned or ongoing activities related to other supply chain fundamentals (see section 3.1 of the CCE Optimisation Platform Guidelines) during the initial support phase, including their sources of funding. Responses to this section should be linked to the EVM Improvement Plan.*

### **Supply chain managers**

*Describe all planned or ongoing activities related to improving the availability and performance of supply chain managers, their sources of funding, and partner support.*

### **Supported by government:**

- Recruitment of CCT and MT-EPI in particular by providing focused technical assistance by government of Bangladesh.
- Monitor and Report implementation progress of CCE and routine EPI data, (DHIS2 Dashboard)

### **Supported by UNICEF:**

- Continuous capacity building of Cold Chain Engineer, Sub-assistant engineers, CCT on CCE repair and maintenance (1 week and 2 weeks training at Punne, India and also need based specific training at Dhaka
- Training on vaccine handling for MT-EPI and other health workers using 3 days training on SOP
- EVM assessors training every 3 years, presently Chittagong, and Dhaka assessment is going on.
- Finalize maintenance plan, vaccine cold chain management training manual
- 5 MOH staff to be trained on international course on vaccine and cold chain management at Kathmandu in the month of September 2018

### **Data for supply chain management**

*Describe all planned or ongoing activities related to data for management, their sources of funding, and partner support. In particular, provide information explaining how improvements to the functionality of logistics management systems will improve the visibility of up-to-date and accurate vaccine stock records at each level of the vaccine supply chain.*

### **Supported by government:**

- DHIS2 is fully operational across the country and VLMIS is already fully operational through DHIS2 at the national, all 64 districts, and 482 upazila stores and 65 large municipalities and 11 city corporations. The VLMIS provide support for indenting, stock management and distribution. This helps in up to date and accurate vaccine and EPI logistics stock records at all level.

	<ul style="list-style-type: none"> <li>• MOH has a plan to enable SMS alarm of temperature monitoring system in DHIS2.</li> <li>• EPI dashboard including supply chain developed and use for monitoring at all level</li> </ul> <p>Supported by UNICEF:</p> <ul style="list-style-type: none"> <li>• UNICEF has been providing all technical support for dashboard development for routine EPI, supply chain and cold chain</li> <li>• Technical assistance for VLMIS and cold chain equipment inventory integration in the DHIS2.</li> <li>• UNICEF is supporting 1 HMIS consultant at national level and 6 at divisional level for DHIS2 data quality assurance</li> </ul> <p>All the RTMD data to be integrated with DHIS2 by developing a bridging software. This software will help in transmitting the data to DHIS2 server from beyond wireless server. Discussion with the beyond wireless has been started and once an agreement is made the bridging software will be developed. Presently, all on line stocks are monitored both at the national and district level and also at the sub-national level. In addition to on line system, there are structured vaccine managements records (stock and issue records used at all levels of supply chain).</p>
<p><b>Optimised, efficient design of the distribution system</b></p> <p><i>Describe all planned or ongoing activities related to distribution system design optimization, their sources of funding, and partner support.</i></p>	<ul style="list-style-type: none"> <li>• Bangladesh has 3 tier iSC system and this system is efficiently functioning and details of it are described in chapter 1, page 9 (Doc # 9). This system will be further strengthened by having 20 new /additional district vaccine hub equipped with efficient and modern technology cold chain equipment.</li> <li>• The district vaccine hub will be completed by the end of 2018 by equipping the remaining 20 district with 30 more cold rooms funded by Gavi HSS2 and vaccine distribution re-design will be fully functional.</li> </ul>
<p><b>Continuous improvement process</b></p> <p><i>Describe all planned or on-going activities related to continuous improvement processes, their sources of funding, and partner support.</i></p>	<ul style="list-style-type: none"> <li>• cEVM iP was developed in September 2014. A 4 year cEVM IP was prepared with 23 recommendations of which 30 high priority 15 medium priority 7 low</li> </ul>


	<p>priority (Doc # 7). Majority of the activities is done by using UNICEF resources. Conducting situational analysis, assess supply chain and updating cold chain equipment inventory through DHIS2.</p> <ul style="list-style-type: none"> <li>• A multi-year supply chain improvement plan is in the process of implementation.</li> <li>• Capacity building of cold chain technicians on temperature mapping of cold rooms is being planned by regional office (ROSA) and selected Bangladeshi technicians will be visiting the regional workshop and after coming from the workshop they will systematically undertake cold room mapping involving other in-country technicians.</li> <li>• Establishment of cold chain and vaccine management committee with clear TOR to follow the recommendation of the EVM IP has been proposed in HSS3.</li> </ul>
<p><b>Temperature monitoring</b></p> <p><i>Describe the temperature monitoring devices that are currently available in the country? E.g. central level (CTMS), sub-national, lowest distribution and service delivery levels (30 DTRs and RTM devices), and during transportation (freeze tags).</i></p> <p><u>Furthermore, describe which measures are in place to</u></p> <p>a) obtain temperature data from the various devices;</p> <p>b) act following temperature alarms (curative maintenance);</p> <p>c) in case of RTM devices, please elaborate on SOPs for each responder in the temperature monitoring system; and</p> <p>d) countries wishing to purchase such devices are required to demonstrate how the recurrent costs, such as HR, data transmission, analysis etc., will be covered in this section.</p>	<p>a) 30 DTR used in each ILR in addition to manual temperature recording. 30 DTR records are printed every week and reviewed by health facility in-charge weekly. Based on 30 DTR alarm cold chain technician visit is requested for required repair and maintenance. This best practice was presented in tech-net 2017 conference at Lisbon, Portugal.</p> <p>b) In the central vaccine store of Dhaka and in few district vaccine store (19 + 15 WICs) are installed with RTMD and temperature monitoring data monitored centrally by Sub-assistant engineers and CCTs and necessary actions are taken if an alarm occurs.</p> <p>c) SOPs are developed by the government of Bangladesh is used for taking action if any temperature alarm occurs (SOPs Doc.# 18)</p> <p>Integration of remote temperature monitoring in DHIS2 for vaccine cold rooms and refrigerators located at district stores by 2020.</p> <p>Temperature monitoring system of WIC/WIF at the central store and district are fully functional with WHO/PQS compliance system (RTM).</p>




	<p>All ILRs are equipped with 30- DTR for continuous temperature-monitoring (Fridge Tags2).</p> <p>All vaccine carriers and cold boxes used for vaccine transportation and to conduct outreach sessions are using electronic freeze indicators from March 2018.</p> <p>d) Remote Temperature monitoring devices used by the country are procured from beyond wireless company through UNICEF SD. In the CCEOP proposal 20 additional WICs need to be equipped with RTMD. ALL these RTMD data presently monitor centrally at Dhaka by departmental CCT funded by MOH&amp;FW. No additional or recurrent cost involved for HR.</p> <p>No additional data transportation cost is incurred at national EPI store, as it has its own broadband internet and paid by MOH through the annual operational cost of vaccine store.</p> <p>Online analysis and monitoring is done by the departmental technician and required training has been obtained from the vendor.</p>
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## PART E: SCALE-UP SUPPORT PHASE

This second phase of Gavi CCE Optimisation Platform support (provided from approximately year 3 onwards) is designed to address additional CCE needs as part of optimizing design and increasing the sustainability of the supply chain.

	Budgets are <b>not inclusive</b> of operational cost. Operational costs must be financed by the Ministry of Health or other partners.
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	Further information on CCE rehabilitation and expansion plan, equipment selection, and strategic deployment plan requirements is provided in Annex 3 of the CCE Optimisation Platform Guidelines, available at <a href="http://www.gavi.org/support/apply/">www.gavi.org/support/apply/</a>
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### 12. Prioritised (Additional) CCE needs (Maximum 3 pages)

Provide information on **2 to 4 prioritized (additional) CCE needs** as identified in the 'CCE rehabilitation and expansion plan, equipment selection and strategic deployment plan requirements'.

For each prioritized (additional) CCE need, please provide the following information:

- The need:** Type of activity (e.g. replace obsolete CCE, extend CCE to unequipped facilities, etc.); specific CCE site (facility); type of equipment required; quantity of equipment items.
- Justification:** Reasons for urgent need (e.g. low CCE and/or immunization (Penta3) coverage area, gender barriers, mobile population, etc.); current CCE and immunization (Penta3) coverage in the population area.
- Expected outcome:** Anticipated increase in CCE and immunization coverage (Penta3); anticipated progress against identified inequity (describe, in alignment with country Performance framework).
- Total CCE budget:** includes Gavi and country joint investment share

#### Prioritised (Additional) CCE Need #1 (Year 2021)

<b>The need</b>		
	CCE model	Number of CCE
	Vestfrost VLS400A (ILR)	244
	Sets of spare parts	100
	Freeze-free cold box	400
	Freeze-free vaccine carrier	3000
	Total refrigerators & freezers	244 (only ILRs)
<b>Justification</b>	244 ILRs for 244 service points for dedicated cool water packs	
<b>Expected outcome</b>	Vaccine transportation quality will be improved as per EVMA recommendations. Dedicated capacity will be available in these facilities for cooling water packs to shift to cool water pack policy.	
<b>Total CCE budget</b>	<b>\$ 950,062</b>	

#### Prioritised (Additional) CCE Need #2 (Year 2022)

<b>The need</b>	CCE model	Number of CCE
	Freeze-free cold box	400
	Freeze-free vaccine carrier	3000
	Fridge Tag2 (replacement)	1,900
<b>Justification</b>	Vaccine transportation quality will be improved as per EVMA recommendations. Replacement of the old and damaged vaccine carriers and cold boxes. Since	

	first phases procured Fridge Tag2 will be expired by 2022 then all Fridge Tag2 need replacement by 2022.
<b>Expected outcome</b>	Vaccine transportation quality will be improved as per EVMA recommendations. All service points will be under temperature monitoring system.
<b>Total CCE budget</b>	<b>\$ 449,016</b>
<b>Prioritised (Additional) CCE Need #3</b>	
<b>The need</b>	
<b>Justification</b>	
<b>Expected outcome</b>	
<b>Total CCE budget</b>	
<b>Prioritised (Additional) CCE Need #4</b>	
<b>The need</b>	
<b>Justification</b>	
<b>Expected outcome</b>	
<b>Total CCE budget</b>	
<b>GRAND TOTAL CCE BUDGET:</b>	<b>\$ 1,399,078</b>
<b>“Scale-up support” (Years 3, 4 &amp; 5 )</b>	

### 13. Summary of SCALE-UP SUPPORT PHASE replacement/rehabilitation, expansion and extension plan

All countries must fill this section to highlight the number of equipment and corresponding number of sites this equipment will serve to meet their replacement/rehabilitation, expansion and extension targets. See Section 6.2 of the CCE optimization Platform Guidelines for the definitions of replacement/rehabilitation, expansion and extension. The values entered below must align with those in Section 9 above and in other parts of the application form.

Replacement/Rehabilitation		Expansion		Extension			
Existing sites with (non)functional and/or obsolete non-PQS equipment to be replaced with platform-eligible ILR, SDD or long-term passive devices (including equipping sites with a larger equipment)		Existing sites with (non)functional and/or obsolete PQS equipment to be replaced with platform-eligible ILR, SDD or long-term passive devices (including equipping sites with a larger equipment)		Equipping existing sites with ADDITIONAL pieces of equipment for new vaccine introduction and/or to serve an increasing population		Equipping previously unequipped sites (providing immunization services or not, including existing sites without active devices) and add new service sites	
<i>No of Equipment</i>	<i>No of sites</i>	<i>No of Equipment</i>	<i>No of sites</i>	<i>No of Equipment</i>	<i>No of sites</i>	<i>No of Equipment</i>	<i>No of sites</i>
				ILR 244	244		
				<b>244</b>	<b>244</b>		

#### 14. Ongoing or planned activities around other supply chain fundamentals in the scale-up support phase

*In this section, linkages must be drawn between requested CCE Optimisation Platform support, on-going Gavi investments (especially through the Health Systems Strengthening support) and other partner supply chain support.*

*Describe planned or ongoing activities related to other supply chain fundamentals (see section 3.1 of the CCE Optimisation Platform Guidelines) during the scale-up support phase, including their sources of funding. Responses to this section should be linked to the EVM Improvement Plan.*

##### **Supply chain managers**

*Describe all planned or ongoing activities related to improving the availability and performance of supply chain managers, their sources of funding, and partner support.*

- The continuous capacity building of Cold Chain Engineer, Sub-assistant engineers, CCT and MT-EPI by an in-house trainer and by the proposed national training center to be established with joint funding from MOH, Gavi and UNICEF.
- Institutionalizing cold chain equipment maintenance through SOP and training module development by the national training center in the local language
- Monitor and Report implementation progress of CCE and routine EPI data, (DHIS2 Dashboard).

##### **Data for supply chain management**

*Describe all planned or ongoing activities related to data for management, their sources of funding, and partner support. In particular, provide information explaining how improvements to the functionality of logistics management systems will improve the visibility of up-to-date and accurate vaccine stock records at each level of the vaccine supply chain.*

- Integrated cold chain and VLMIS with DHIS2 will be further strengthened with GIS mapping of cold chain point and vaccine store for remote monitoring with the facility-based dashboard on immunization supply chain.
- Developed bridging software and enables SMS alarm of temperature monitoring system in DHIS2.
- EVM 2.0 tool used for targeted assessment and data used along with DHIS2 dashboard for programmatic action
- Cold room mapping will be done every 2 years by departmental technicians. They will be given hand-on training in Kathmandu in November 2018 on temperature mapping of cold room and temperature monitoring study.

##### **Optimised, efficient design of distribution system**

*Describe all planned or ongoing activities related to distribution system design optimization, their sources of funding, and partner support.*

- Country's immunization supply chain system performance will be reviewed using the EVMA 2.0 tool and other tools and required adjustment will be made with the support of UNICEF

##### **Continuous improvement process**

*Describe all planned or ongoing activities related to continuous improvement processes, their sources of funding, and partner support.*

- Majority of the proposed CIP activities of 2014 have been implemented. Next, EVM will be done using the EVMA 2.0 tool and IP

	<p>will be prepared for scale-up phase using UNICEF resources.</p> <ul style="list-style-type: none"> <li>• Implement and monitor a multi-year supply chain improvement plan.</li> <li>• Review of cold rooms mapping status as quality indicator</li> <li>• Functional status of cold chain and vaccine management committee (national logistic working group) reviewed.</li> </ul>
<p><b>Temperature monitoring</b>  <i>Describe how the temperature monitoring system will evolve? Which devices will be used?</i>  <u>Furthermore, describe which measures are in place to</u>  <i>a) obtain temperature data from the various devices;</i>  <i>b) act following temperature alarms (curative maintenance);</i>  <i>c) in case of RTM devices, please elaborate on SOPs for each responder in the temperature monitoring system; and</i>  <i>d) countries wishing to purchase such devices are required to demonstrate how the recurrent costs, such as HR, data transmission, analysis etc., will be covered in this section.</i></p>	<p>Bangladesh is presently having a comprehensive temperature monitoring system for vaccine and cold chain starting from national level store to health facility level using RTMD and 30 DTR respectively. The country would like to maintain the present temperature monitoring system with a plan to integrate temperature monitoring within DHIS2. Presently all cold rooms are fitted with beyond wireless company devices and staffs are well trained. A well-organized temperature monitoring system is in place. After sale support has been satisfactory. Hence the country would like to continue and expand the use of beyond wireless devices during the scale-up phase. During the scale up phase, the country would like to expand RTMD to district level for all ILRs. Since beyond wireless do not have option for ILR use and Nexleaf devices are more suitable for ILR use. The country would like to introduce nexleaf for district level. This is also cost effective device. The country would like to continue the use of Fridge tag 2 as it has been found cost effective, user friendly and staffs are well trained on the use.</p> <ul style="list-style-type: none"> <li>a) Remote temperature monitoring device like beyond wireless for all the WICs in the country. All ILRs across the country at present using Fridge tag2 device.</li> <li>b) Fridge tag2 data is used regularly for identification of equipment for corrective maintenance and post repair temperature maintenance monitoring.</li> <li>c) The country has already developed a SOP for RTM. Required actions are taken based on the SOP. As per the SOP any temperature alarm in the cold room, SMS and telephonic call first comes to local technician and in the absence of any intervention by local technician, the alarm is escalated to the next level i.e. cold chain</li> </ul>

engineer (national level) and subsequently to EPI manager.

- d) Remote Temperature monitoring devices used by the country are procured from beyond wireless company through UNICEF SD. In the CCEOP proposal 20 additional WICs need to be equipped with RTMD. ALL these RTMD data presently monitor centrally at Dhaka by departmental CCT funded by MOH&FW. No additional or recurrent cost involved for HR.

No additional data transmission cost is incurred at national EPI store having its own broadband internet and paid through MOH through the annual operational cost of vaccine store.

Online analysis and monitoring is done by the departmental technician and required training has been obtained from the vendor.

All vaccine carriers and cold boxes used for vaccine transportation and to conduct outreach session will have electronic freeze indicators.

## PART F: BUDGET TEMPLATES

This section details the number of requested equipment items and equivalent budget. A maximum investment amount (and indicative number of equipment items) corresponding to the phased support request will be considered for recommendation of approval by the IRC and subsequent decision by Gavi.

However, in consultation with the Secretariat and in-country partners, the number of equipment items may be modified when the detailed operational plan is developed subsequent to the Platform proposal and the support may vary within the limit of the approved maximum amount.

Budgets must be completed in the attached budget template, and with reference to the **CCE Optimisation Platform Guidelines, Gavi CCE Optimisation Platform Technology Guide and CCE planning prices and Total Cost of Ownership (TCO) analysis tool**.

### 15. CCE Optimisation Platform - Budget Template

*To be filled by **ALL** countries after selection of equipment that best suit their CCE needs (e.g. specific model and make).*

*Countries will plan with indicative PQS prices and corresponding service bundle estimates (depending on equipment being on/off-grid and estimated costs of service bundle).*

*Planning price ranges are provided in this template.*

*How to fill the attached budget template: Countries should:*

- *Select appropriate 'Equipment Model' against the listed equipment types*
- *Fill out the 'Estimated service bundle cost' and 'Number of equipment' requested*
- *(In the last 'Total CCE OP Request' table), fill out second and third preference for each model selected. The second and third preference should be comparable products in the same capacity segment. **Countries are informed that Gavi, and its Alliance partners principally UNICEF, will try as much as possible to respond to countries' first preference, but manufacturers' lead time could also lead to countries receiving cost estimates for either their second or third preference.***

**Completed budget template should be sent as an attachment along with application form.**

#### **Budgeting for Buffer and Procurement fees**


- *Buffer fees: A 7% buffer on **total equipment cost** is built into country yearly budgets. This will cover currency variations, demurrage and associated costs and will be returned to country, if unused.*
- *Procurement fees: Countries will also need to **pay UNICEF's procurement costs for the country joint investment portion**, estimated to be up to 8.5%. Please obtain actual amounts from the UNICEF country office.₂*

## PART G: PERFORMANCE FRAMEWORK

Countries must include **CCE Optimisation Platform indicators** in the application. The indicators need to be included in the Performance Framework for the current and/or proposed Gavi HSS support, after Platform proposal approval.

According to their specific context, countries are required to consider the most appropriate data sources to report on programme implementation and progress against the targets set. This should be discussed with partners (which may provide technical assistance) and the Gavi Secretariat.

Programmatic reporting updates, as well as targets and indicator updates, will be made as part of the Gavi performance framework and annual Joint Appraisal process. Countries are expected to consider relevant smart indicators to be monitored and reported against, in terms of intermediate results or outcomes/impact.

	Further information on developing relevant indicators, including a list of possible data sources, is provided in Section 7.2 of the CCE Optimisation Platform Guidelines, available at <a href="http://www.gavi.org/support/apply/">www.gavi.org/support/apply/</a>
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### 16. Indicator monitoring and reporting requirements

As a **minimum**, countries need to monitor and report on:

- **5 MANDATORY intermediate results indicators;**
- **1 MANDATORY intermediate result indicators if countries are procuring User independent freeze protected cold boxes and vaccine carriers; and**
- **1 to 3 ADDITIONAL intermediate results indicator(s).**

- 1) **CCE Replacement/Rehabilitation in existing equipped sites:** Percentage of existing sites with (non)functional and/or obsolete non-PQS and PQS equipment to be replaced with platform-eligible ILR, SDD or long-term passive devices (including equipping sites with a larger equipment)
- 2) **CCE Expansion in existing sites:** Percentage of existing sites being equipped with ADDITIONAL pieces of equipment for new vaccine introduction and/or to serve an increasing population;
- 3) **CCE Extension in unequipped existing and in new sites:** Percentage of previously unequipped sites (providing immunisation services or not, including existing sites without active devices) and new service sites being equipped with Platform eligible equipment.



4) **CCE maintenance** : Well-defined indicator proposed by country to reflect appropriate maintenance of equipment; for example percentage of equipped facilities with functioning cold chain,<sup>5</sup> such as demonstrated by remote temperature monitoring; **and**

5) **Freeze-free to non-freeze-free carrier ratio**: Ratio of freeze-free cold boxes/carriers to non-freeze-free cold boxes/carriers in-country?

**USE THE TABLE BELOW TO COMPLETE MANDATORY INDICATORS**

<b>Indicator</b> <i>(Provide name of the mandatory indicator as shown above)</i>	<b>Definition</b> <i>(Provide definition if not already specified)</i>	<b>Data Source</b> <i>(identify data source)</i>	<b>Reporting frequency</b> <i>(annual, semi-annual, quarterly etc.)</i>	<b>Baseline Year (2019)</b> <i>(Provide numerator and denominator for calculating percentage)</i>	<b>Target Year 1 (2020)</b> <i>(Provide numerator and denominator for calculating percentage)</i>	<b>Target Year 2 (2021)</b> <i>(Provide numerator and denominator for calculating percentage)</i>	<b>Target Year 4 (2022)</b> <i>(Provide numerator and denominator for calculating percentage)</i>
<b>1. CCE Replacement/rehabilitation in existing Equipped sites</b>	Percentage of existing sites with (non)functional and/or obsolete non-PQS and PQS equipment to be replaced with platform-eligible ILR, SDD or long-term passive devices (including equipping sites with a larger equipment)	CCE inventory through DHIS2	Annual	Numerator = 0 Denominator=805 Percentage=0%	Numerator = 561 Denominator=805 Percentage=70%	Numerator = 805 Denominator=805 Percentage= 100%	Numerator = NA Denominator=NA Percentage=NA
<b>2. CCE expansion in existing equipped sites:</b>	Percentage of existing sites being equipped with ADDITIONAL pieces of equipment for new vaccine introduction and/or to serve an increasing population;	CCE inventory through DHIS2	Annual	Numerator = 0 Denominator=548 Percentage=0%	Numerator = 548 Denominator=548 Percentage=100%	Numerator = NA Denominator=NA Percentage=%	Numerator = NA Denominator=NA Percentage=%

<sup>5</sup> **Indicator definition:** % CCE functioning = (# functioning CCE devices) / (total # of CCE devices designated for use). CCE devices considered for this indicator include all refrigerators, fixed passive storage devices, walk-in cold rooms and freezers designated for string vaccines. Both the numerator and denominator should be collected from the same geographical area / period in time and should not include decommissioned equipment. Functionality of CCE is broadly defined to mean that the device is operable at a particular point in time for storing vaccine.

3. CCE extension in unequipped existing and/or new sites:	Percentage of previously unequipped sites (providing immunisation services or not, including existing sites without active devices) and new service sites being equipped with Platform eligible equipment.	CCE inventory through DHIS2	Annual	Numerator = 0 Denominator=55 Percentage=0%	Numerator = 55 Denominator=55 Percentage=100%	Numerator = NA Denominator=NA Percentage=%	Numerator =NA Denominator= NA Percentage=%
4. CCE maintenance	Percentage of functional CCE in the system	DHIS2	Six monthly	Numerator = 0 Denominator=1164 Percentage=0%	Numerator = 1048 Denominator=1164 Percentage=90%	Numerator = 1267 Denominator=1408 Percentage=95%	Numerator = 1267 Denominator=1408 Percentage=95%
5. Freeze-free to non-freeze-free carrier ratio	Ratio of freeze-free cold boxes/carriers to non-freeze-free cold boxes/carriers in-country	DHIS2	Annual	Freeze-free =1000 Non-freeze free=9,000	Freeze free =4,000 Non-freeze free =6,000	Freeze free = 7,000 Non-freeze free =3,000	Freeze free = 10,000 Non-freeze free=0

**ADDITIONAL intermediate results indicator(s):** Countries are required to suggest 1 to 3 intermediate results indicators to track performance of rehabilitation, expansion, maintenance and/or other supply chain fundamentals (include baseline, data source, targets and frequency of reporting).

**Examples** of additional intermediate results indicators options are:

1. **Functional status of cold chain equipment:** Ratio of functional CCE and ratio of districts with at least 90% functional equipment;
2. **Closed vial wastage:** Rate at a national, district and facility level;
3. **Forecasted demand ratio:** Ratio of actual usage compared to forecast (vaccines);
4. **Full stock availability:** Ratio of facilities/districts without any stock out;
  - a. Stocked according to plan: Percentage of facilities/stores/districts that have stocks levels between set minimum and maximum stock levels;
5. **Temperature alarms:** Frequency and magnitude of heat and cold alarms per monitoring period (i.e., temperature excursion) and number of CCE devices with more than a certain level of temperature excursion;
6. Rate of health facilities dashboard use, timely analysis and use for decision making;
7. **On-time and in-full (OTIF) delivery:** Ratio of order completely delivered on time; **or**
8. Number of health managers trained and despatched for supply chain oversight function and rate of reported monitoring activities.

**USE THE TABLE BELOW TO COMPLETE ADDITIONAL INDICATORS**

<b>Indicator</b> <i>(Provide name of the additional indicators as shown above)</i>	<b>Definition</b> <i>(Provide definition if not already specified)</i>	<b>Data Source</b> <i>(identify data source)</i>	<b>Reporting frequency</b> <i>(annual, semi-annual, quarterly etc.)</i>	<b>Baseline (Year)</b> <i>(Provide numerator and denominator for calculating percentage)</i>	<b>Target Year 1</b> <i>(Provide numerator and denominator for calculating percentage)</i>	<b>Target Year 2</b> <i>(Provide numerator and denominator for calculating percentage)</i>	<b>Target Year 3 (If applicable)</b> <i>(Provide numerator and denominator for calculating percentage)</i>
1. Ratio of district with functional CCE	90% out of 64 districts with functional CCE	DHIS2	Six monthly	Numerator = 0 Denominator=64 Percentage=0	Numerator = 57 Denominator=64 Percentage=90%	Numerator = 57 Denominator=64 Percentage=90%	Numerator = 57 Denominator=64 Percentage=90%
2. Incidence of temperature excursions in district	Less than 5 % from all equipment	DHIS2	Six monthly	Numerator = 0 Denominator=0 Percentage=0	Numerator = real-time Denominator=real-time	Numerator = real-time Denominator=real-time	Numerator = real-time Denominator=real-time

stores					Percentage<5%	Percentage<5%	Percentage<5%
3. Rate of health facilities dashboard use, timely analysis and use for decision making;	More than 95% out of 756 facilities will use dashboard	DHIS2	Quarterly	Numerator = 0 Denominator=756 Percentage=0	Numerator = 680 Denominator=756 Percentage=90%	Numerator = 718 Denominator=756 Percentage=95%	Numerator = 718 Denominator=756 Percentage=95%
Add more indicators HERE if needed.							