



17th TechNet Conference

Panama City, Panama | October 16-19, 2023

Immunization Programmes That Leave No One Behind

www.technet-21.org

Managing your cold chain inventory: Innovations to make your life easier

Cecilia de Busto: Chief of Nutrition in UNICEF Guatemala

Vivian Salomon: Health Specialist, UNICEF Guatemala

Oleg BENES, Technical officer, WHO Euro

Erida NELAJ, Consultant, WHO Euro

Irakli GABISONIA, NCDC, Georgia

Christine Lanyero, Uganda National Expanded Program on immunization

Paul Sagyiri, Uganda National Expanded Program on immunization

October 17, 2023

Digital tool to improve equipment and Cold chain capacity inventory at national level in Guatemala

unicef  para cada infancia



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Digital tool to improve equipment and Cold chain capacity inventory at national level in Guatemala

- Background
 - COVID-19 pandemic
 - Challenges with the Cold Chain Management Equipment
 - Mapping of information system's gaps for immunization (COVID-19)
 - Government of Japan support

Approach



DESING OF INVENTORY
TOOL



TEAM INTEGRATION



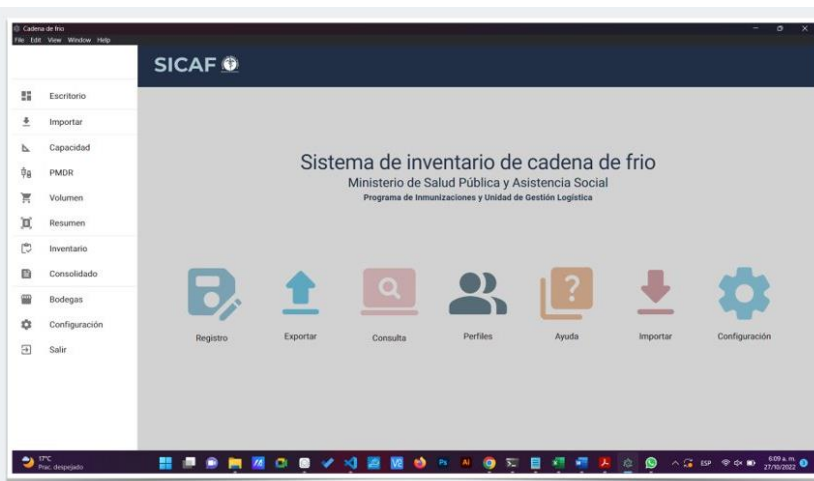
TOOL DEVELOPMENT
AND VALIDATION

Data Process and workflow

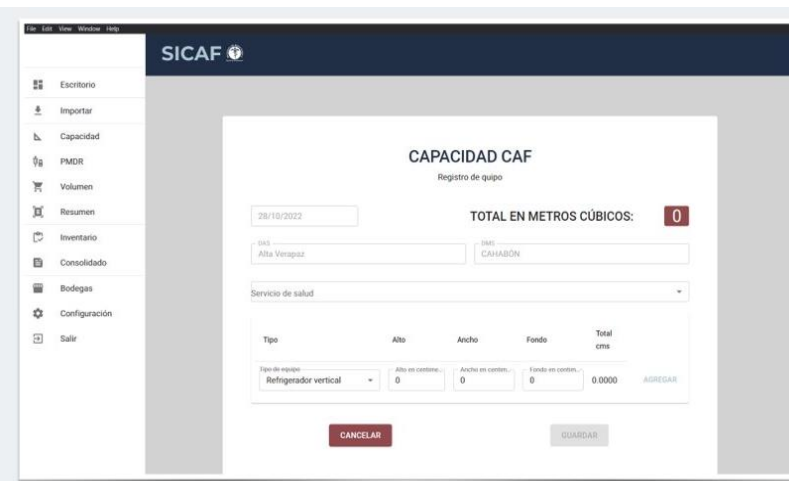


Logging and Reporting

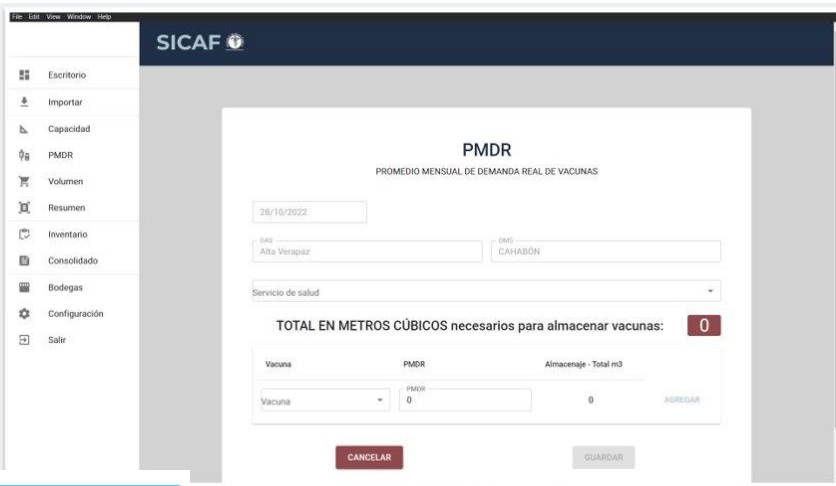
Dashboard



Capacity
Calculation
Record
CaF



Monthly
Average
Record of
Actual
Vaccine
Demand
PMDR



Capacity
Overview
CaF





Reporting

SICAF

Dirección de área de salud: Alta Verapaz | Distrito Municipal de salud: Cahabón

Informe y reportería

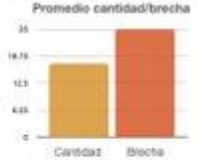
Fecha	Actualizado por	Volumen/PMDR	Volumen/Inventario CaF	Exportado
10/09/2022	Manuel Perusina	0.0000	0.0000	10/09/2022  

Resumen cálculo Capacidad CaF | **Consolidado cálculo Capacidad CaF** | **Consolidado Inventario CaF**

Estadísticas actualización - 10/09/2022

CONSOLIDADO INVENTARIO CADENA DE FRÍO

Promedio cantidad/brecha



Categoría	Promedio
Cantidad	~12.5
Brecha	~15.5


CONSOLIDADO CAPACIDAD CADENA DE FRÍO

Refrigerador vertical	Refrigerador horizontal	Congelador	Cuarto frío
7.75	12.78	121.07	889.14

TOTAL METROS CÚBICOS NECESARIOS PARA ALMACENAJE DE VACUNAS

300.14

TOTAL METROS CÚBICOS NECESARIOS PARA ALMACENAJE DE VACUNAS



Categoría	Porcentaje
Refrigerador vertical	7%
Refrigerador horizontal	10%
Congelador	71%
Cuarto frío	28%

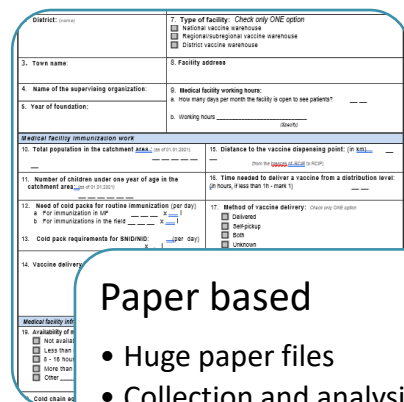
[Descargar tabla e informe](#) ↓

Enhancing Cold Chain Inventory Data Quality and Use – Experience in WHO European Region



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Cold chain inventories in the WHO Euro region



3. Town name
4. Name of the supervising organization
5. Year of foundation
6. Facility address
7. Type of facility
8. Medical facility working hours
9. Working hours
10. Total population in the catchment area
11. Number of children under one year of age in the catchment area
12. Need of cold packs for routine immunization
13. Cold pack requirements for SMD/ID
14. Vaccine delivery
15. Distance to the vaccine dispensing point
16. Time needed to deliver a vaccine from a distribution point
17. Method of vaccine delivery
18. Availability of electricity

Paper based

- Huge paper files
- Collection and analysis was very difficult.
- Limitation on facilities' data
- Not possible to update every year



CONDITION OF COLD CHAIN AND EPI EQUIPEMENT						
INFORMATION ON EQUIPEMENT						
Type Equip	MAKE	MODEL	serial N°	Refrigerant	Vol - (litres)	Vol + (litres)
FR	Zenit	GR26SK/E		R134a	16	32
AF	Electrolux	FCW20EG/CF		NH3	14	0
SE	BP SOLAR	VR50F		R134a	0	18
CF	Electrolux	FCW300		R134a	264	0
CR	Vestfrost	MF114		R134a	72	0

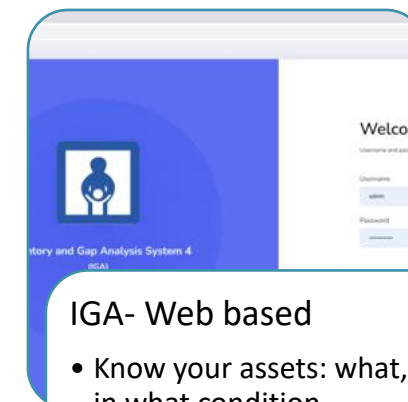
Excel files

- Different countries had different models
- Mostly refrigerators and freezers have been collected.
- Data analysis improved but focused more on the type and age of equipment.
- Easier to update annually.



CCEM – Access based

- Equipment Inventory + Analysis Tools
- Enable countries to do their own cold chain analysis and equipment planning
- Required continuous support



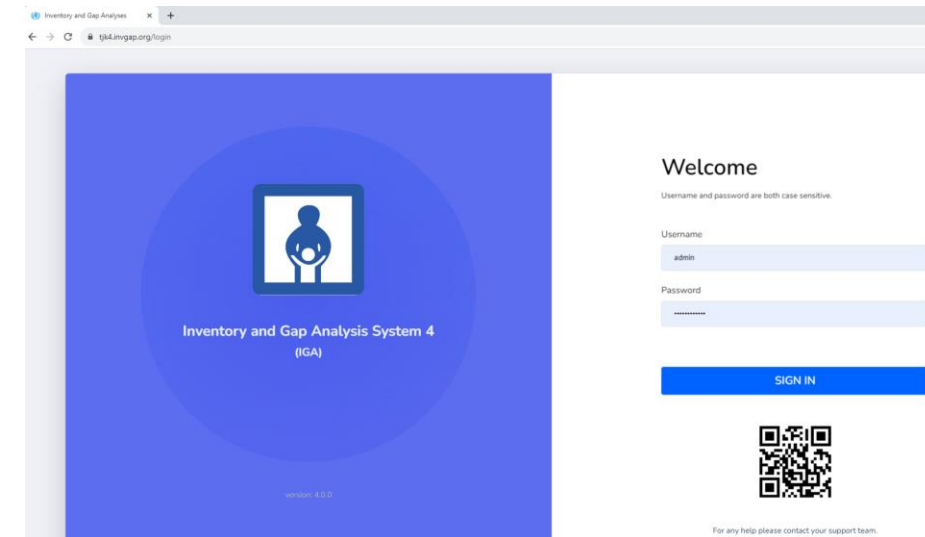
IGA- Web based

- Know your assets: what, where, in what condition
- Real time data entry and update
- Different items can be recorded.
- Challenge on data quality (validation is required)
- Access to countries is limited



Inventory Gap Analysis tool – web based

- Still a tool in development
- Already used in 4 countries (GEO, TJK, AZE, KGZ)
- Process:
 - Configuration based on country requirements
 - Training/piloting
 - Data entry
 - Data cleaning
 - Data analysis
 - Inventory report and procurement plan
- Real time update of inventory by users



Objectives

- Create a web-based database of all facilities involved into immunization supply chain, by administrative divisions, functionality and levels;
- Record all cold chain equipment by facility, type and functionality;
- Continuously update the data in the IGA tool

Expectations

- Real-time visibility
- Multi-location management/tracking
- Accessibility
- Enhanced reporting
- Preparation of inventory report and new equipment procurement plan.

Challenges



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Tailoring the tool to the country needs

- Each country has its own portal - IGA needs to be set up in a dedicated server.
- Country should establish a working group with good knowledge on active and passive cold chain equipment and country needs and requirements.
- Configuration is a lengthy and crucial process which should be finalized before the data entry.
- It can be translated manually in any language, but it requires dedicated person and time.
- The need for a proper and clear guideline on the configuration process.
- Continuous support from developers

Data collection and quality

- Basic knowledge in cold chain equipment (measurements, volumes, etc.)
- Each facility should be visited in person to obtain high quality data;
- Completeness and relevance of data: Collect all required data and ensure that data aligns with the objectives;
- Maintaining the accuracy of collected data;
- Avoiding data duplication;
- Ensure error free and precise data transfer into the tool;
- Challenges with accessibility or issues/bugs;

Lesson learned



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Do's & Don'ts

- Do country after country.
- Have on site trainings
- Have decision makers in country team
- Give access to configuration only after data collection/cleaning is finalized.
- Do not change configurations
- Inform developers on future schedule
- Test, Pilot, before true inventory
- Regular data check ups
- Monitor the process

- Start several countries at once.
- Have online trainings
- Have only end users in country team
- Give access to configurations to country team from the beginning
- Modify configurations anytime
- Contact developers only in case of bugs
- Start inventory right after trainings
- Clean the data at the end
- No monitoring is required

Learning from previous mistakes & success stories

1. Starting data collection with the updated version without testing it before can be risky.
2. Help features need to be translated as well as the rest of the data entry fields.
3. Using android tablets vs using web-based tool on laptops;
4. PQS identification was difficult in GEO, AZE but improved in the updated version used on KGZ
5. Trying to use only required/mandatory field rather than leave them optionally helped a lot on getting full information.

Preparation of Inventory report and procurement plan



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Comprehensive Inventory report

IGA tool offers a lot of possibilities for data collection but so far lacked on reporting part

Raw data can be exported and detailed analysis can be obtained on:

- Identifying links/gaps between cold chain equipment status, allocations, distances of facilities, power sources, vaccination coverage etc.
- Identification of cold chain storage gaps based on several criteria (equipment working status, WHO prequalification status, equipment age, new vaccine introductions, etc.)
- Etc.

Procurement plan based on identified gaps and priorities for the country

- List all potential criteria for allocation of cold chain equipment for vaccine storage
 1. Equip facilities with missing/broken equipment
 2. Replace all with domestic refrigerators
 3. Replace equipment >10-15 years of age
 4. Equip all facilities with Passive storage equipment (vaccine carriers + icepacks)
- Prioritize facilities based on the number of children and cold chain equipment status

Acknowledgment

- MoH and Immunization programs of:
 - Georgia,
 - Azerbaijan,
 - Tajikistan,
 - Kyrgyzstan.
- WHO- HQ
- IGA developer team

Calm, cool, and (data) collected

Uganda's adoption and use of the Cold Chain Information System



Outline



Introduction

Introduction of the Digital Cold Chain Information System (CCIS)



The System

Platform Key Features and Accessibility



Impact of the CCIS

Impact and Potential Challenges of Future Prospects

Key Features of CCIS

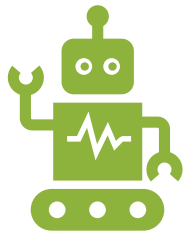
Platform & Accessibility



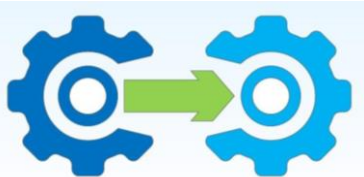
Mobile application built on the **ODK-X platform**, a step-up from traditional ODK.



Enables **bidirectional data sync** – both from devices to central servers and vice versa.



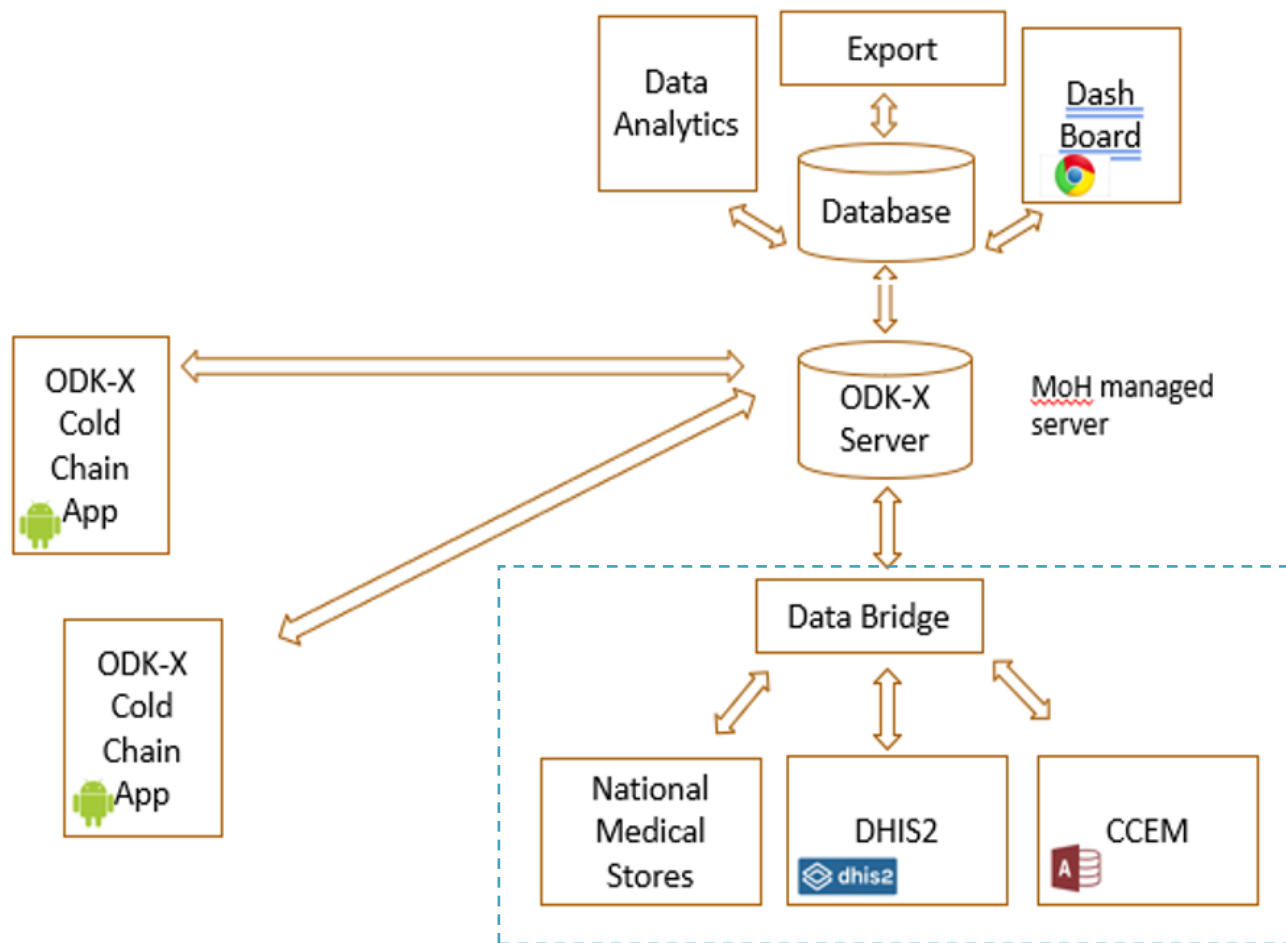
Accessible via **Android devices** with robust **offline functionality** – sync when online.



Interoperable with existing health information systems and tools (for example, DHIS2, WHO IGAP).

Key Features of CCIS

System Structure



ODK-X APP Structure

It is primarily structured to capture CCE Inventory data, temperature data and maintenance records.

- Mobile App built on the ODK-X platform

Geographic Hierarchy

Country > Region > District > Health Facility

Data Hierarchy

Health Facility > Refrigerators/Cold Rooms > Maintenance Log

Primary data elements

1 Facility information

Nooksack Tribal Library

UNITED STATES/ WASHINGTON/ Whatcom/ Deming

Basic Facility Information

Primary Facility ID: 613	Catchment Population: 0
Secondary Facility ID: 613	Ownership: Special Hospital
Facility Level: Hcii	Authority: Special Hospital
Contact Name: Flipper	Facility Status: Functional
Contact Phone Number: 3037297.909	

Power Information

Electricity Source: Solar	Gas Cylinder Availability: Not Applicable
Grid Availability: More Than 16 hrs/day	

Location Information

Latitude (GPS): 1.67561742	Longitude (GPS): 31.82855632
----------------------------	------------------------------

Stock Information

Distance To Supply Point: 0 km	Vaccine Supply Mode:
Vaccine Supply Interval: 4 weeks	

Facility data fields

- Facility Key
- CCEM ID
- DHIS2 ID
- Facility Name
- Admin Region
- Type
- Ownership
- GIS Coordinates
- Catchment Population
- Electricity Source
- Grid Power Availability
- Gas Availability
- Immunization Services
- Vaccine Supply Type
- Distance From Supply
- Cold Boxes
- Vaccine Carriers
- Ice Packs
- Spare Temperature Monitors
- Facility Phone Number
- Contact Person

2 CCE information

Refrigerator 87643

Basic Refrigerator Information

Facility: Nooksack Tribal Library	Manufacturer: Haier
Year Installed: 2020	Model ID: HTC 110 SDD
Status: Not Functioning	Serial Number: 665544322
Use Status: Installed Not In Use	Catalog ID: E003076
Reason Not Working: Needs Spare Parts, Awaiting Installation	Voltage Regulator? Not Applicable
Service Priority: High	Temperature Monitoring Device? Not Applicable
Date Serviced:	

Edit Refrigerator Status

Add Maintenance Record

View All Maintenance Records

Add Temperature Data

Fridge Tag

View All Temperature Data

View Model Information

Refrigerator and cold room data fields

- Refrigerator ID
- Facility
- Model ID
- Manufacturer
- Power Source
- Serial Number
- Tracking ID
- Temperature Monitor
- Monitor Type
- Monitor Status
- Voltage Regulator
- Regulator Type
- Warranty Status
- Year Installed
- Year Procured
- Utilization
- Functional Status
- Maintenance Priority
- Reason Not Working
- Notes

Primary data elements

3 Maintenance and repair

Maintenance Logs < Back Next >

Who performed the service?

Warranty/Service Provider

CCE Technician

Facility Staff

Other:

Enter technician name

not specified

Enter technician phone number if available

not specified

Refrigerator under warranty contact Jose at 665545789i

Maintenance Logs < Back Next >

Enter the date of service

2023 / 08 / 02

Select type of maintenance

Repair

Preventative

Other

Select type of preventative maintenance

Cleaning - cabinet

Cleaning/drying - storage compartment

Cleaning - solar panels

Defrosting

Tightening

Check seals

Check/clean cooling unit

Maintenance and repair data fields

- Refrigerator
- Date Serviced
- Actions Taken
- Notes
- Preventative Maintenance
- Spare Parts
- Serviced by
- Technician Name
- Technician Phone
- Warranty Provider Contact

4 Temperature records

Refrigerator Temperature Data < Back Next >

Refrigerator ID: 91be01a2-ab04-44d5-a28c-f92d341ed92d

Reporting Period

Enter the date for the reporting period

2023 / 08 / 03

Number of High Alarms Over Last 30 Days

not specified

Number of Low Alarms Over Last 30 Days

not specified

Days with Temperatures Above 8°C, Last 30 Days

not specified

Days with Temperature Below 2°C, Last 30 Days

not specified

Temperature monitoring fields

- Refrigerator
- Reporting Period
- Days Above 8°C
- Days Below 2°C
- High Alarms
- Low Alarms

Temperature Tag Reader



Please plug the Temperature Tag in to the device and press SEARCH FOR TAG button.

SEARCH FOR TAG

CANCEL



CCIS in Uganda

Training and devices

Uganda deployment at scale

- Pilot (2020): Three districts with 15 district cold chain technicians/assistants (DCCT/As).
- Scale (2022): Launched across all 136 districts and 160+ users by UNEPI and NMS, with support from PATH and the UW.
 - Jan 2022: Trainings: Training of trainers and 150 district cold chain technicians
 - July 2022: Refresher training for all users (160+ DCCT/As).



Results

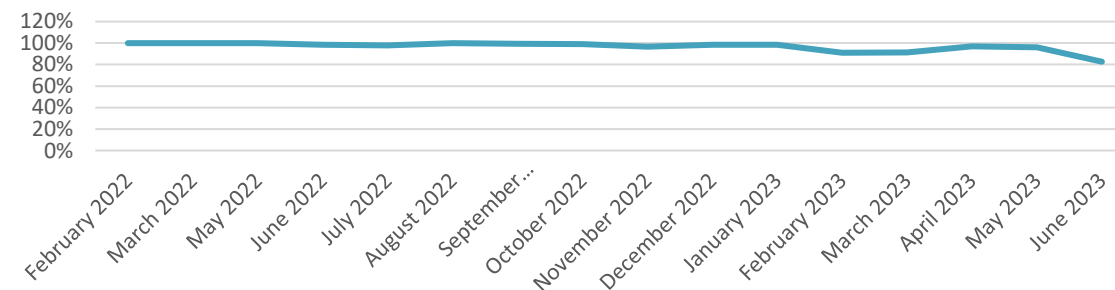
CCE inventory

6,095 CCE currently installed in Uganda HCFs

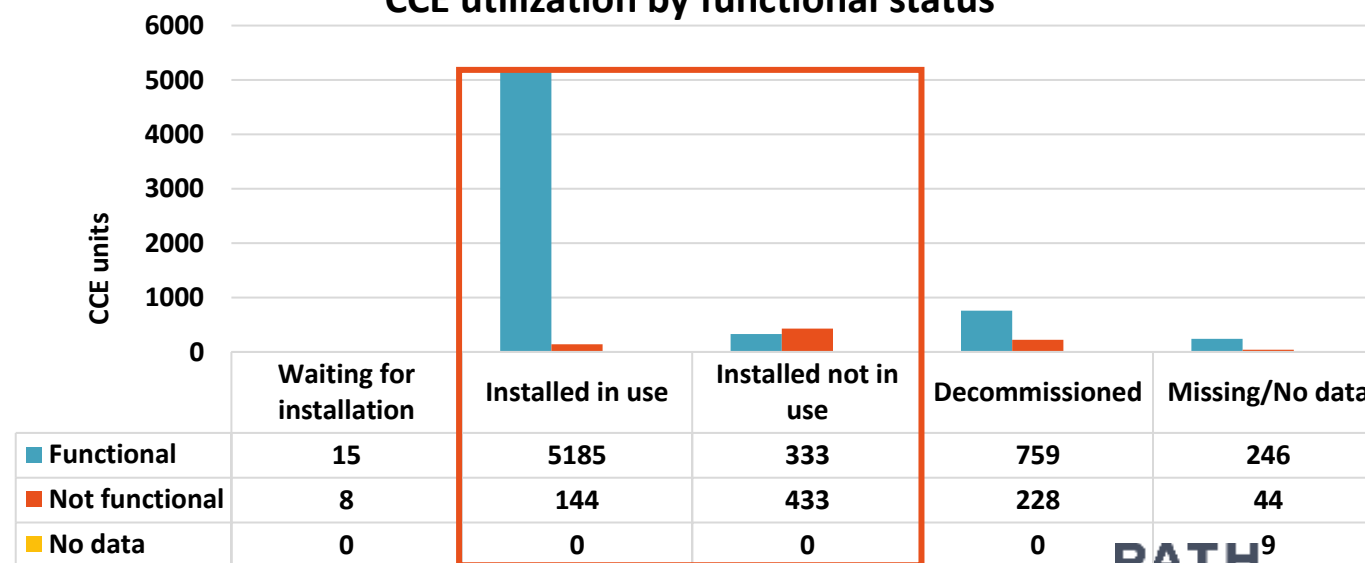
97% Functionality rate of CCE installed that is in use
(=5,185 CCE installed in use and functional / 5,329 CCE installed in use [functional + not functional])

987 CCE have been or are designated for decommissioning

Month by month functionality rate
(CCE installed in use and functional / CCE installed in use functional and nonfunctional)



CCE utilization by functional status



Data from February 1, 2022, to June 20, 2023

CCE maintenance

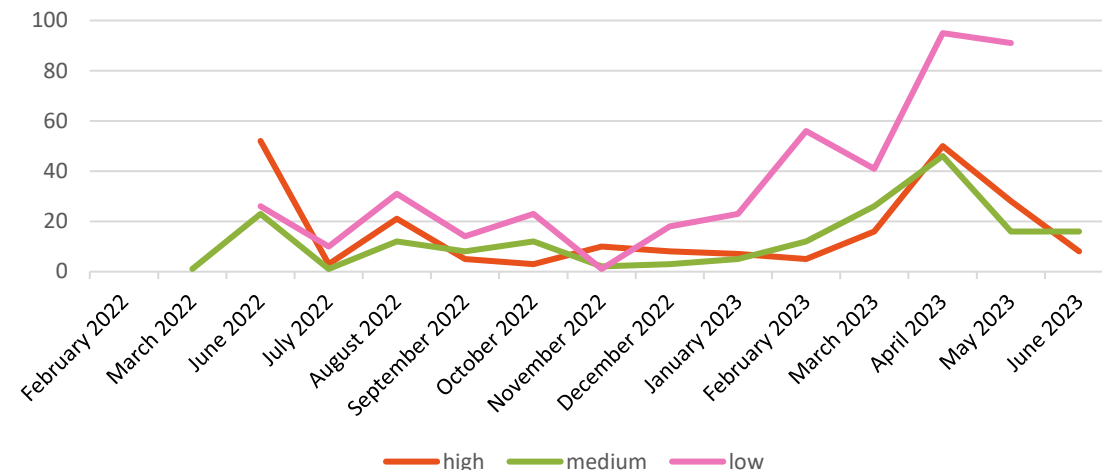
5,990 Maintenance logs created

Maintenance type	Total logs saved (n)	Total logs saved (%)
Preventative	5,613	94%
Repair	325	5%
Other	52	1%
Grand total	5,990	100%

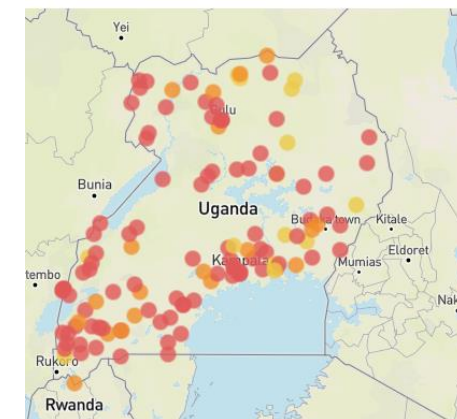
534 Spare parts installed

Spare parts	No.
Electrical (e.g., thermostat, fuse, compressor, capacitor)	243
Refrigerator (e.g., thermostat probe, compressor, filter, refrigerant)	184
Power supply (e.g., circuit breaker, fuse, power plug)	34
Temperature monitoring (daily temperature record)	30
Hardware (e.g., door hinges, baskets)	30
Solar (e.g., PV components/supplies)	13

of maintenance flags (high, medium, low) by month



Maintenance priority by facility



Data from February 1, 2022, to June 20, 2023

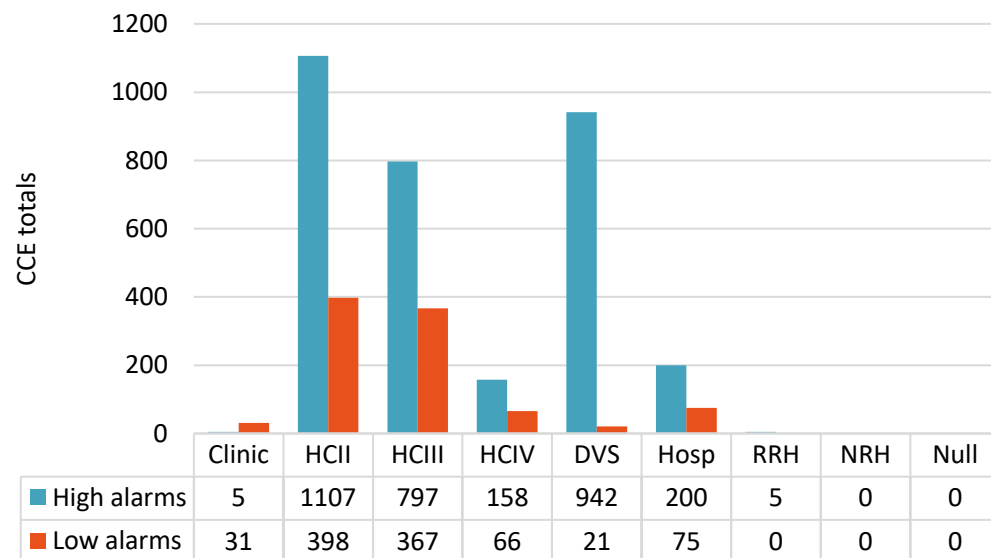
CCE temperature

29,119 Temperature logs recorded (*cumulative*)

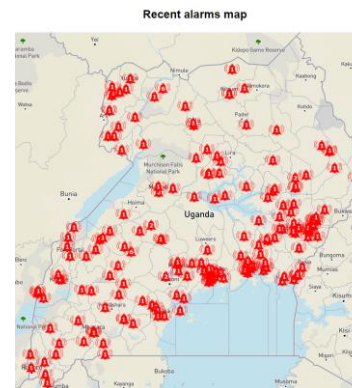
12,839 High temperature alarms

3,584 Low temperature alarms

CCE * alarms by facility level: April–June 2023



■ High alarms
■ Low alarms



UNEPI quarterly reports



Reporting Date: Thursday 13th October, 2022

Background

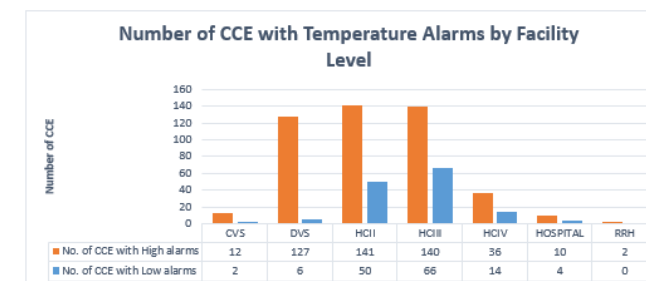
Temperature monitoring is one of the key performance indicators in effective vaccine management for ensuring quality and effective vaccines across the vaccine supply chain. Health workers are required to monitor and record Vaccine equipment temperature readings using the daily temperature charts, twice daily.

Findings

Following the rollout of the ODK-X Android application for management of Cold Chain Equipment Inventory data in June 2022, there has been a significant improvement in submission of monthly CCE temperature reports by District Cold Chain Technicians.

- Number of districts that reported – 114
- Non reporting districts – 16 (as listed below)

AMURIA	BUSIA	KANUNGU	NAKASEKE
AMURU	BUTAMBALA	MITYANA	NAKASONGOLA
APAC	KAABONG	MOYO	NAMUTUMBA
BUGIRI	KALAKI	MPIGI	NAPAK



1

Impact of the CCIS

Positive Outcomes Post-CCIS Implementation



Enhanced CCE Functionality: Longitudinal view of CCE **functionality rate** with most recent rate of **98%** in September 2023.



Data-Driven Decision Making: At the national level, staff from UNEPI and NMS now employ CCIS data for holistic cold chain inventory management, procurement strategizing, and consistent reporting to **critical** TWGs such as the **Vaccine Management Committee**.



Optimized Maintenance Activities: NMS personnel harness the data to prioritize, strategize, and plan for CCE repair and maintenance tasks, ensuring a more responsive and agile system.



Accountability & Warranty Management: Warranty data captured using the application **enhanced accountability** and laid down robust groundwork for spare part and repair warranty claims.

For more
information
contact:

Christine Lanyero

Cold chain technician manager
Uganda National EPI
christinelanyero06@gmail.com

Brian Kigozi

Senior Maintenance Engineering Officer
National Medical Stores, Uganda
brian.kigozi@nms.go.ug

Paul Sagyiri

Vaccine Supply Chain Manager
Uganda National EPI
paulsagyiri1@gmail.com

Matt Morio

Technical Advisor/Senior Business Analytics Officer
mmorio@path.org

Jacqueline Anena (on maternity leave through Nov 2023)

Senior Program Officer
janena@path.org



Thank You!

Cecilia de Busto: cdebustos@unicef.org

Vivian Salomon: vsalomon@unicef.org

Erida NELAJ nelaje@who.int

Christine Lanyero christinelanyero06@gmail.com

Paul Sagyiri, paulsagyiri1@gmail.com