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2018 Global Health Supply Chain Summit
Lusaka, Zambia

GHSCS Prize Submission

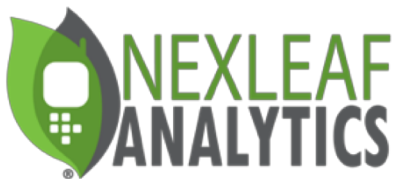**11th Conference on Health and Humanitarian Logistics**
Nov 28 - 30, 2018

Presenter: NGWEGWE CHRISTOPHER BULULA

COLD CHAIN PERFORMANCE DATA VISIBILITY IN TANZANIA

TANZANIA

- ☐ Area: **945,050 Km2**
- ☐ Pop :   **48,751,804m**
- ☐ Regions: **31**
- ☐ Councils: **196**
- ☐ Health F: **6991**
- ☐ Pregn. W: **2,021,342**
- ☐ Surviving Inf: **1,869,739**

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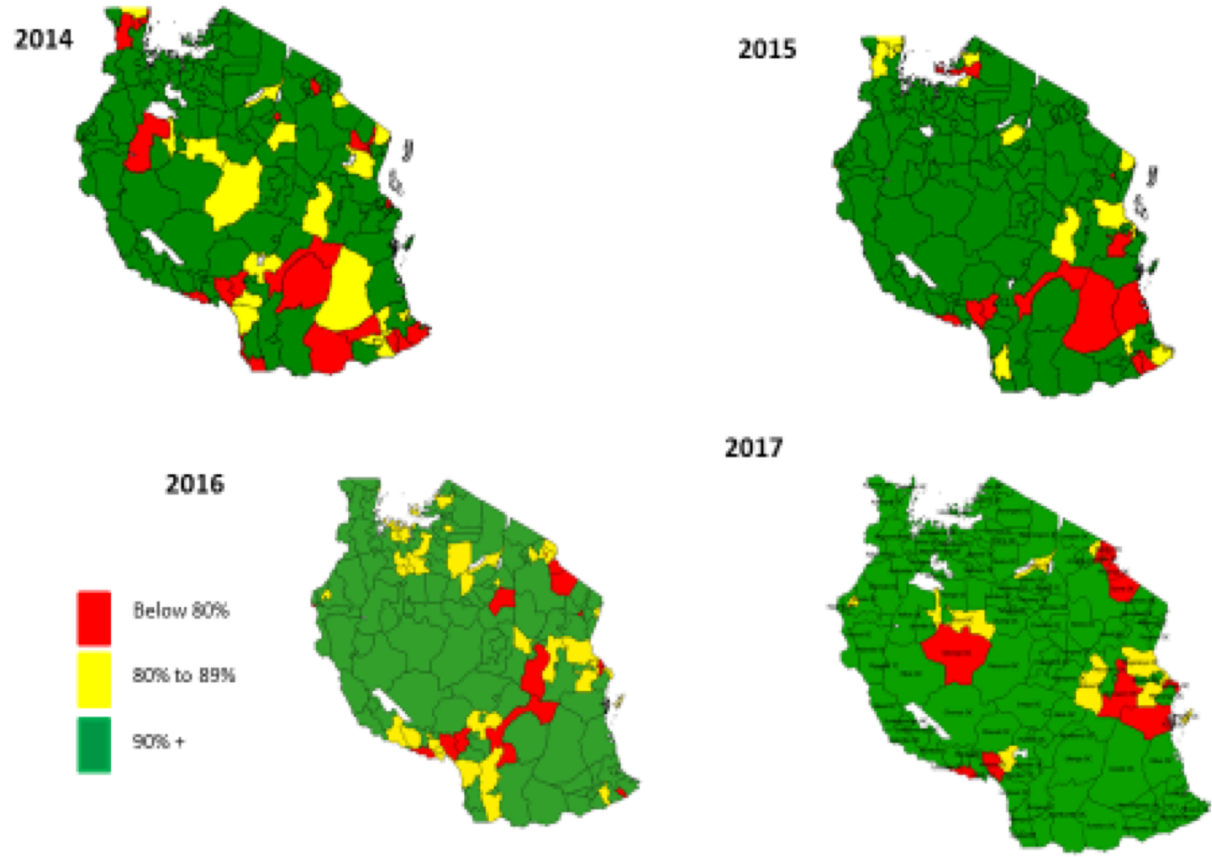Lusaka, Zambia

Overall IVD Direction 2016-2020

- *Sustain high coverage while reaching every last child equitably*
- *Expand immunization service to life course approach*
- *Reduce vaccine preventable diseases through new vaccine introductions*
- ***Adopt and update new technology in cold chain, supply chain and data***

Immunization Performance

2014   2015

2016   2017

Below 80%
80% to 89%
90% +

Tanzania ◆ 2018 ◆ IVD ◆ HSS-2 Application

VACCINE MANAGEMENT LEVELS

- ## National Vaccine Stores (2)
    - ➢ Based in Dar and have capacity to store vaccines stock of 6 months
    - ➢ Distribute to the Regions

- ## 35 Regional Vaccine Stores
    - ➢ Equipped with Walking Cold Rooms with standby generators
    - ➢ Have capacity to store vaccines for 3 months
    - ➢ Distribute to the districts

- ## 195 District Vaccine Stores
    - ➢ Equipped with Refrigerators with standby generators
    - ➢ Have capacity to store vaccines for 3 months
    - ➢ Distribute to the health facilities

- ## 6,336 Health Facilities
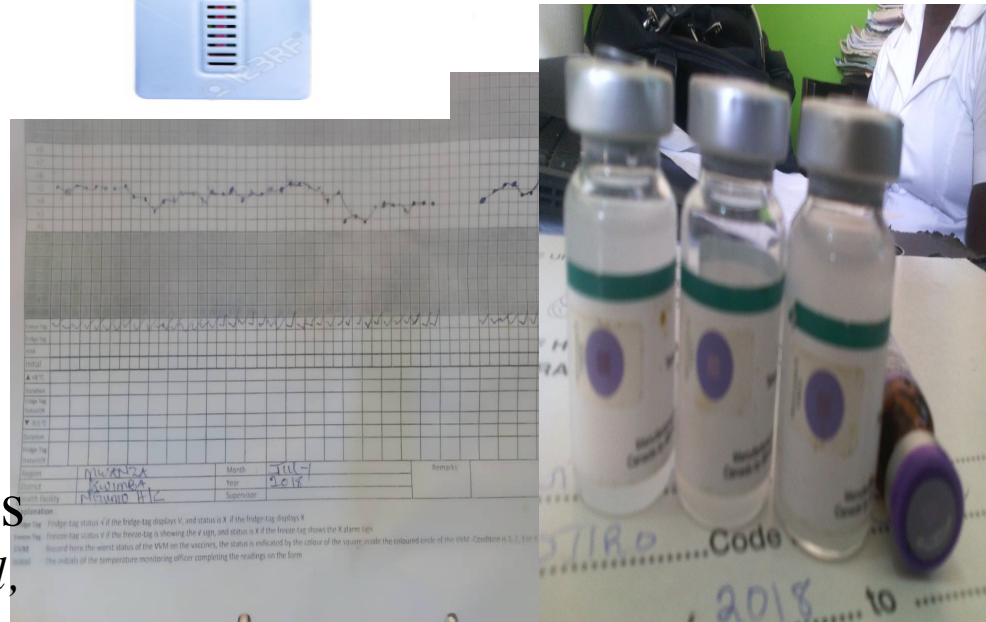   - ➢ igerator to store vaccines for 6 weeks

Cold Chain is Essential for Vaccines

Photo by Ian J. Connors

- WHO standards require vaccines to be kept between 2 ˚C and 8 ˚C (35.6 ˚F – 46 ˚F)

- Ensures vaccine safety and preserves potency

- Difficult to accurately monitor temperatures throughout the immunization supply chain

CHALLENGES OF TEMPERATURE MONITORING

- Does not store temperature records
- Does not provide visibility of temperature data records

- 95-98% of HFs monthly reports indicate normal temp. range.
- About 40%-50% of HFs were reported to store vaccines beyond recommended temperatures *(Makuru M, 2012) &Sia Ringo et.al, 2017)*

- New gadgets require physical visits
- Temp. Monitoring study, 40 shipments (2014)
  - 36% exposed to freezing temp
  - 85% heat excursions

No.	Date (dd.MM.yyyy)	Events*	Average temp.	Lower alarm limit				Upper alarm limit				Signature / notes Action taken
				Status	Min. temp.	Duration out of range	Alarm trigger time	Status	Max. temp.	Duration out of range	Alarm trigger time	
31	11.07.2018		+7.4°C	ok	+7.0°C	0min		ok	+7.8°C	0min		
32	10.07.2018		+7.4°C	ok	+7.0°C	0min		ok	+7.9°C	0min		
33	09.07.2018		+7.8°C	ok	+7.4°C	0min		ok	+10.1°C	4h 18min		
34	08.07.2018		+7.9°C	ok	+7.3°C	0min		ok	+9.8°C	7h 2min		
35	07.07.2018		+8.8°C	ok	+7.5°C	0min		ALARM!	+11.0°C	13h 57min	20:55h	
36	06.07.2018		+8.1°C	ok	+7.6°C	0min		ALARM!	+8.8°C	12h 58min	05:23h	
37	05.07.2018		+7.1°C	ok	+4.2°C	0min		ok	+11.8°C	9h 44min		
38	04.07.2018		+4.9°C	ok	+4.0°C	0min		ok	+5.8°C	0min		
39	03.07.2018		+6.0°C	ok	+4.5°C	0min		ok	+12.2°C	1h 30min		
40	02.07.2018		+6.1°C	ok	+5.8°C	0min		ok	+7.0°C	0min		
41	01.07.2018		+6.0°C	ok	+5.7°C	0min		ok	+6.4°C	0min		
42	30.06.2018		+6.0°C	ok	+5.6°C	0min		ok	+6.3°C	0min		
43	29.06.2018		+6.0°C	ok	+5.7°C	0min		ok	+6.5°C	0min		
44	28.06.2018		+7.8°C	ok	+6.5°C	0min		ok	+13.0°C	3h 44min		
45	27.06.2018		+7.7°C	ok	+7.2°C	0min		ok	+8.2°C	2h 23min		
46	26.06.2018		+7.8°C	ok	+7.3°C	0min		ok	+8.3°C	6h 53min		
47	25.06.2018		+8.2°C	ok	+7.8°C	0min		ALARM!	+8.7°C	18h 2min	00:00h	
48	24.06.2018		+10.8°C	ok	+8.5°C	0min		ALARM!	+17.4°C	1d	00:00h	
49	23.06.2018		+20.9°C	ok	+17.4°C	0min		ALARM!	+22.5°C	23h 49min	00:00h	
50	22.06.2018		+18.3°C	ok	+16.1°C	0min		ALARM!	+20.7°C	1d	00:00h	
51	21.06.2018		+12.9°C	ok	+10.3°C	0min		ALARM!	+16.1°C	1d	00:00h	
52	20.06.2018		+9.0°C	ok	+8.5°C	0min		ALARM!	+10.3°C	1d	00:00h	
53	19.06.2018		+9.1°C	ok	+8.6°C	0min		ALARM!	+10.0°C	1d	00:00h	
54	18.06.2018		+10.0°C	ok	+9.3°C	0min		ALARM!	+11.2°C	1d	00:00h	
55	17.06.2018		+9.1°C	ok	+8.7°C	0min		ALARM!	+9.7°C	1d	00:00h	
56	16.06.2018		+9.0°C	ok	+8.5°C	0min		ALARM!	+9.5°C	1d	00:00h	
57	15.06.2018		+9.2°C	ok	+8.7°C	0min		ALARM!	+10.1°C	1d	00:00h	
58	14.06.2018		+9.8°C	ok	+8.5°C	0min		ALARM!	+11.0°C	1d	04:46h	
59	13.06.2018		+8.5°C	ok	+7.8°C	0min		ALARM!	+9.2°C	19h 7min	18:46h	
60	12.06.2018		+7.8°C	ok	+7.3°C	0min		ok	+8.5°C	8h 20min		

Date and place: Signature:

ADOPTION OF NEW TECHNOLOGY

- Knowledge sharing with Mozambique MoH

- Objective:
  - Introduce RTM in up to 5000 health facilities

- Stakeholders involved:
  - Tanzanian Ministry of Health, Nexleaf Analytics, JSI, Gavi, the Vaccine Alliance, & Google.org

Photo by Ian J. Connors   Photo by Ian J. Connors

COLDTRACE

What does RTM do?

Sends SMS alerts to designated health workers for immediate action to help prevent vaccine spoilage when the temperature is too hot or freezing, or when there is a power outage.

Data gathered by the device is:

1. Automatically uploaded onto the RTM dashboard.
2. Analytics on the dashboard provides visibility into the CCE performance for different managerial levels at the MoH.
3. Contributes to addressing cold chain failures to ensure that only potent vaccines are administered to beneficiaries.

The MoH is using the RTM system ColdTrace.
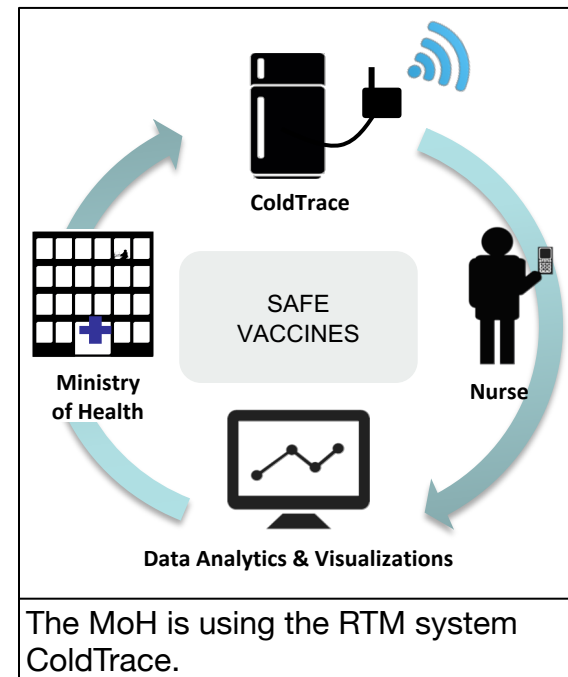
TANZANIA IMPLEMENTATION

Phase 1:
- November 2017 - December 2018
- 120 devices installed in health facilities and District Vaccine Stores (DVS) in six councils
- Trainings for cold chain technicians, MoH personnel and logisticians at the national and regional levels on installation, monitoring, and dashboard analytics for escalation and preventative action

Phase 2:
- January 2019 - December 2020
- Tanzania will scale RTM to all the sites in the country (~ 5000)
  - Assist with evidence-based CCE procurement and maintenance planning
  - CCE data will be integrated into the country's LMIS system

Eventual scale of RTM.
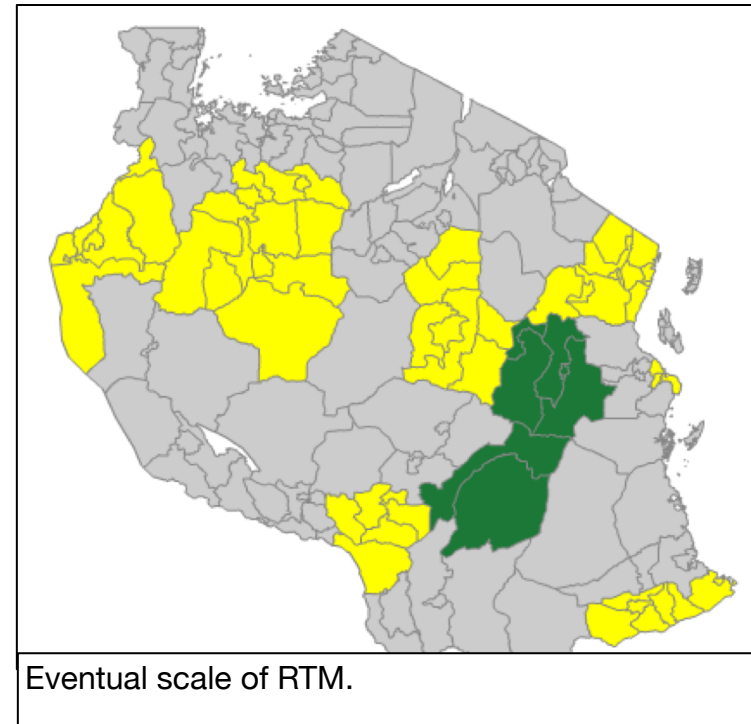
DATA-DRIVEN ACTIONS: INCREASED UPTIME

- *Uptime* is the amount of time a CCE spends in the ideal range of 2 °C to 8 °C.

- Since first installing RTM devices, **overall fridge *uptime* increased from 78.5% to 87.2%**
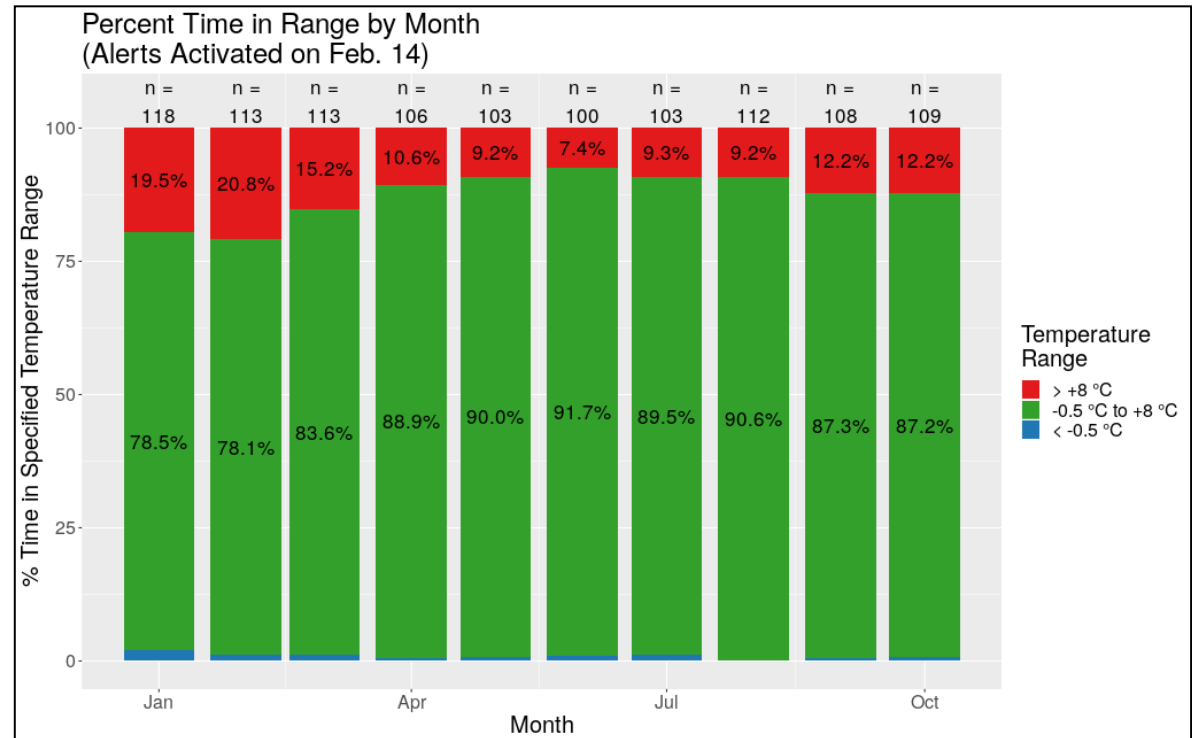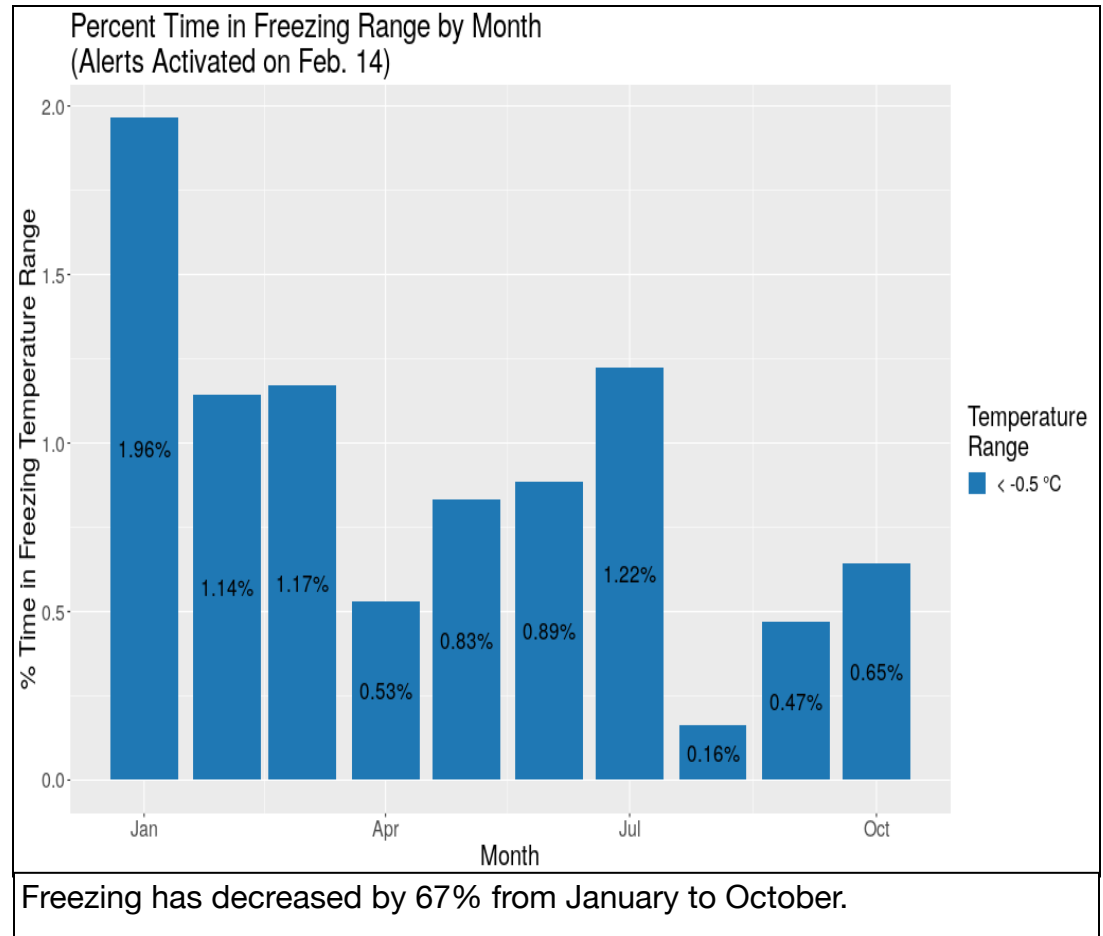

Fridge uptime for CCE in Tanzania from Jan to Oct. 2018, showing uptime improvement. ('n' indicates the number of CCE)

REDUCED FREEZING RATES

- **Freezing rates in cold chain equipment in Tanzania decreased by 67%** since health workers and managers started to receive real-time data on cold chain performance, from 1.96% in January 2018 to 0.65% in October 2018.

- Data visibility led to increased awareness of cold chain equipment problems, which led to directed solutions:
  - National level CCE technicians
  - Thermostat adjustments
  - CCE cleaning/defrost

Percent Time in Freezing Range by Month
(Alerts Activated on Feb. 14)

Freezing has decreased by 67% from January to October.

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COLD CHAIN DATA DISCUSSIONS

The dashboard's data analytics discussed at:

- Quarterly Maternal and Child Health Meetings
- The national Technical Working Group (TWG)
- The 2018 JSI annual review meeting for Tanzania mainland and Zanzibar

The issue tracking application LogME:

- A Nexleaf tool channeling information flow between technicians and managers to:
  - Catalog resources (e.g. tools, spare parts) needed during maintenance visits
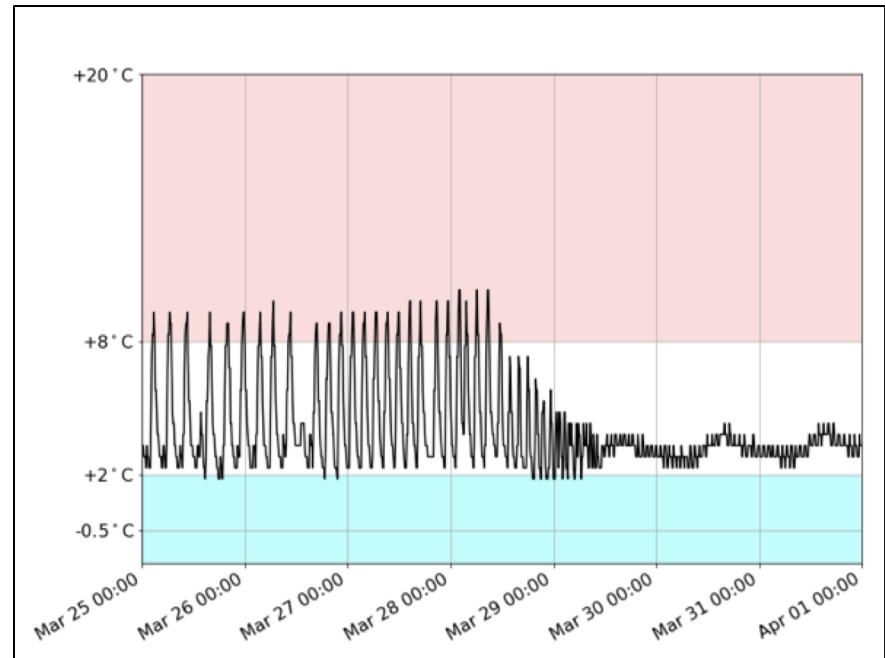 - Track cold chain failures systematically

Healthcare workers trained to use LogME, an issue tracking application.

A Kilombero DIVO introduced the RTM and Vaccine Information Management System (VIMS) dashboards to local district council meetings.

- Action taken: Council used aggregated data to act on pending CCE issues and allocated additional funds to CCE repairs.
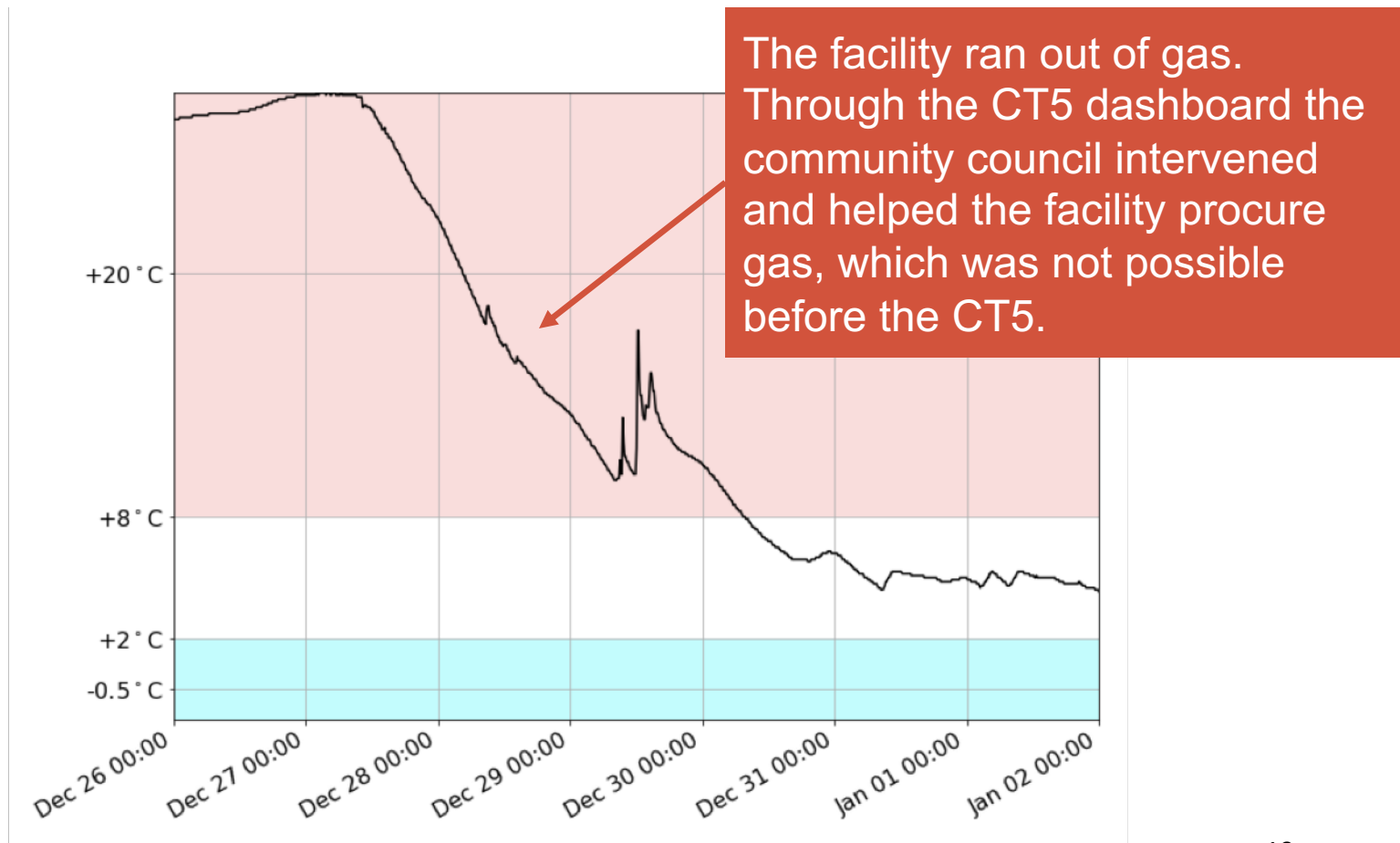

Tanzania CCE data reflecting action taken.

Ensuring availability of LPG to run the CCE driven by RTM data

The facility ran out of gas. Through the CT5 dashboard the community council intervened and helped the facility procure gas, which was not possible before the CT5.

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RTM DATA CONNECTS HEALTH WORKERS

Personnel at every level are working together and using data to strengthen the cold chain.

Photo by Ian J. Connors

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NEXT STEPS ON DATA VISIBILITY

- Integrating RTM into VIMS (Vaccine Information Management System) to have one streamlined data management system

- Improving human resource capacity through training on RTM and data platform; updating standard operating procedures (SOPs).

- Improved use of RTM data during regular immunization meetings at national, county and district levels

- Application LogME developed to track maintenance issue to provide an information flow connecting technicians and managers

INTEROPERABILITY WITH NATIONAL LMIS: VIMS

Data integration with VIMS for improved systems operation.

VIMS

Cold Chain Temperature Status

Skip	Cold chain asset	Serial #	Model	Energy Source	Status	Temperature		Temperature Alarm Episo
						Min	Max	Low Alarm
☐	Dometic / RCW50 EG		RCW50 EG			0	0	0

Benefits of Interoperability:

- When the RTM system detects a non-functional refrigerator at a vaccine delivery point, it automatically flags the equipment within VIMS, indicating that it needs attention. This allows supervisors and warehouse managers who are deciding on how much stock to send to a delivery point to see whether the refrigerator at that facility is functioning, and decide whether – or not – to send product.

- The integrated systems can notify appropriate stakeholders about immediate outages in cold chain equipment, allowing for rapid detection and resolution of any issues.

- With VIMS, logisticians can account for cold chain outages when planning to resupply stock, as well as assessing the state of the overall cold chain equipment functionality.

CHALLENGES

- Importation of the RTM devices logistically and financially challenging; a Memorandum of Understanding between partners and IVD/MOH is currently under development to facilitate the importation of the next round of devices.

- During the installation process, some facilities had to be changed at the last minute due to available telecommunications network; for Phase 2, the team has mapped out preferred networks by facility to improve installation processes.

KEY LESSONS LEARNED

- Improving the visibility of CCE problems can alert higher level supervisors, validate reports from healthcare workers, and drive action.

- SMS alerts can drive immediate responses to temperature excursion; data on the dashboard contributes to longer-term planning from monitoring cold chain equipment.

- Data visibility alone cannot drive action, **must be within a system for data review and data use**.

- Need a strong cold chain equipment maintenance system in place to be able to respond to now-visible cold chain issues.

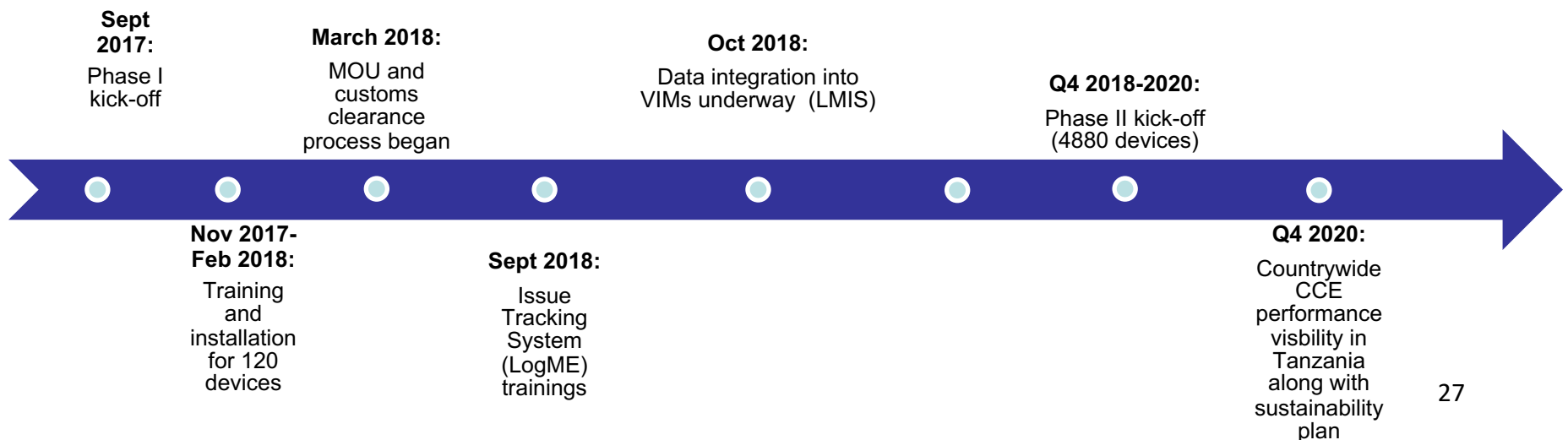# NEXT STEPS FOR COLD CHAIN STRENGTHENING IN TANZANIA

- IVD in Tanzania has already committed to scaling up RTM across the country with government ownership and leadership and with support through HSS-2.

- Continue to strengthen the data review process with all levels to promote a data use culture.

- Continue to work through the details of a transition and sustainability plan for government ownership, and for long-term planning for cold chain equipment needs.

OWNERSHIP AND SUSTAINABILITY

The MoH has undertaken to make the RTM system an integral part of their EPI program.

- Health Systems Strengthening (HSS II) plan:
  - All costs related to the ColdTrace system included into the MoH's budgeting initiatives
  - Intragovernmental MoU being processed for special customs clearance of CT5 devices
  - Integration of the RTM dashboard into the national LMIS
- National training session planned on the RTM platform for immunization health personnel
- Working on a transition plan for government ownership and sustainable CCE planning

Sept 2017:
Phase I kick-off

March 2018:
MOU and customs clearance process began

Oct 2018:
Data integration into VIMs underway (LMIS)

Q4 2018-2020:
Phase II kick-off (4880 devices)

Nov 2017-Feb 2018:
Training and installation for 120 devices

Sept 2018:
Issue Tracking System (LogME) trainings

Q4 2020:
Countrywide CCE performance visbility in Tanzania along with sustainability plan

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Thank You!

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