VILLAGE REACH

Digital Solutions for Efficient Lab Sample Transportation

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Dual-purpose Tec4med sample tracker arriving at the national laboratory in Kinshasa, DRC with polio samples from a remote area. Photo credit: Wolff Mugos for VillageReach

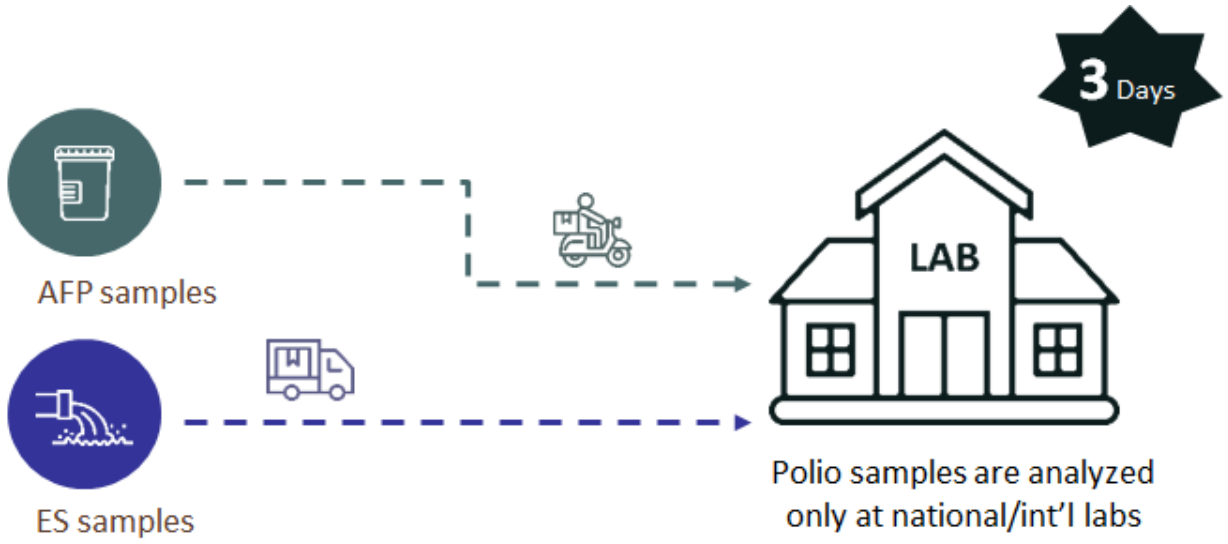
Problem Statement

Challenges in achieving Global Polio Eradication Initiative (GPEI) transportation time targets.

- Most delays in Polio Lab Sample Transport occur in-country between the point of collection at the community/health center & the district/provincial hospital (tier 1) and from there to national capital (tier 2).
- However, countries that must send Polio samples to a lab abroad also incur delays during int'l transit (tier 3).
- GPEI has set a target of just 3 days for samples to reach the lab, regardless of where the lab is located.

Reasons for delays:

- Vast distances, geographic barriers
- Areas of insecurity (samples must wait)
- Lack of incentives/fast reimbursement
- Health staff turnover (retraining needed)
- Bureaucratic delays/extra stops
- Transport delays (community to HF)
- Irregular flights & airline space constraints
- Limitations of integration across diseases



Digital Solutions

What problems did we try to solve with the introduction of Digital Solutions?

- Lack of real-time data and dashboards to address transportation bottlenecks and route adherence
- Temperature excursions (deviations from 2-8 degrees C) during transport, to ensure sample quality
- Lack of centralized sample notification system to ensure data visibility and transport coordination

Digital trackers & web platforms are now providing **geolocation** & **temperature** monitoring for shipments:

- **Tec4med** – dual-purposes devices in use in DRC, Mozambique, Malawi, Chad, Cameroon & soon Kenya
- **Accent systems** – dual-purposes devices used in Guinea
- **Parsyl** – for temperature monitoring only, being piloted in Zambia
- **U-TRIX log tags** – for temp monitoring only, used in Nigeria, Ethiopia, South Sudan (chosen by country)
- **Tracking Echantillon** paired with dual-purpose trackers, locally developed app & web database in Guinea

Centralized sample notification systems:

- **USSD notification system** – adapted by R4H to polio samples in Malawi (and soon for measles) – HWs send SMS (text) for free after 1st AFP sample is collected and have the option to send 2nd notification to request transport from couriers; system assigns unique identifier to samples, and provides daily updates
- **AlôVida** – national MoH toll-free hotline in Mozambique – HWs can call after 1st and 2nd AFP samples are collected, which triggers **on-demand transportation** request (by many local transporters, via Bollore)

Digital Solutions Assessment

Digital Solutions Assessment Domains

Sample Transport

Ability to uniquely identify and track samples during transport, including temperature monitoring

Sample Testing Results

Ability to display and/or notify a user on results availability

Dashboards and Analytics

Data analysis tools and ability to export data in multiple formats

Country Implementations

Countries where the solution has been implemented

Important considerations: **Complementing/enhancing** the existing data system(s) in country + **strengthening** the national database so it is the '**one source of truth**' for all other reporting

Assessment Outcomes

	Logistimo Fleet	Tec4Med	AVADAR	R4H	Parsyl	WebIFA	Tracking Echantillon (Guinea)	RESTRACK (Uganda)
Overall Score	**20**	**24**	**12**	**15**	**3**	**13**	**23**	**18**
	74%	**89%**	**44%**	**56%**	**11%**	**48%**	**85%**	**67%**
Sample Transport	12	14	7	9	3	9	12	8
	86%	100%	50%	64%	21%	64%	86%	57%
Sample Testing Results	2	3	0	0	0	2	3	3
	50%	75%	0%	0%	0%	50%	75%	75%
Dashboards and Analytics	6	7	5	6	0	2	8	7
	67%	78%	56%	67%	0%	22%	89%	78%

Photo credit: VillageReach

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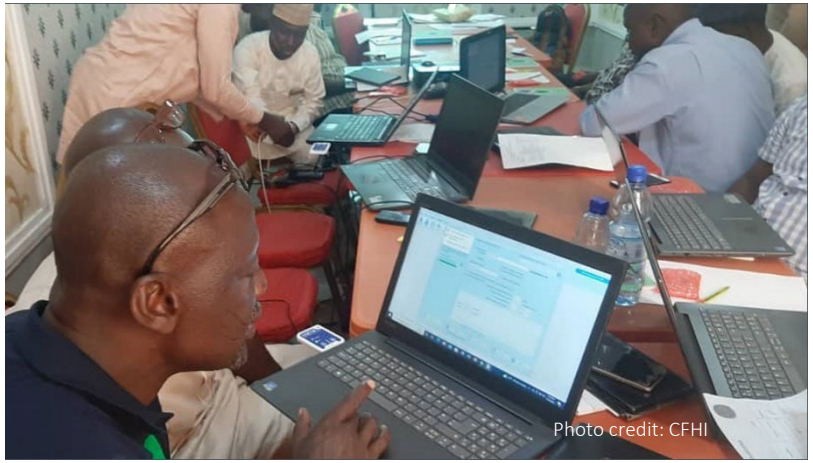


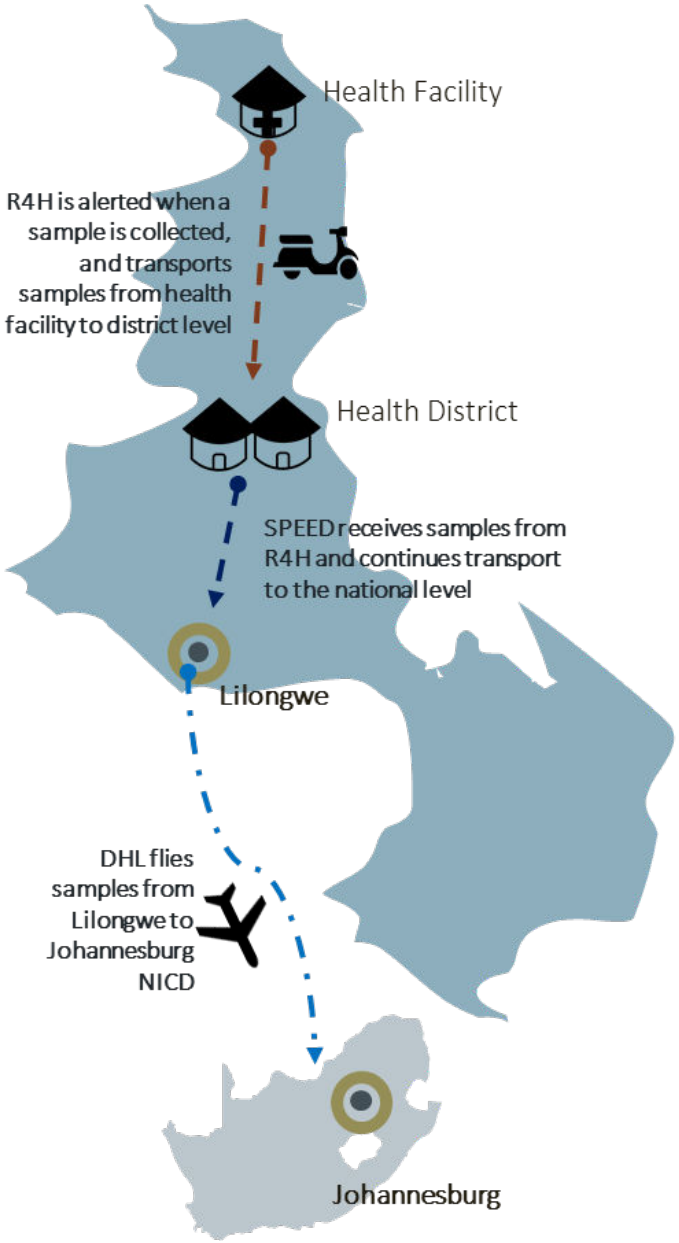
Photo credit: CFHI

Malawi: Notification of suspected polio cases by Health Workers

- Adapted **USSD system** in Malawi to polio samples to centralize HW alerts
- Assignment of **unique identifiers** to samples
- Informing transporters and MoH managers when samples are **collected** or **ready for pick-up**
- Real-time transport data provided through accessible dashboards

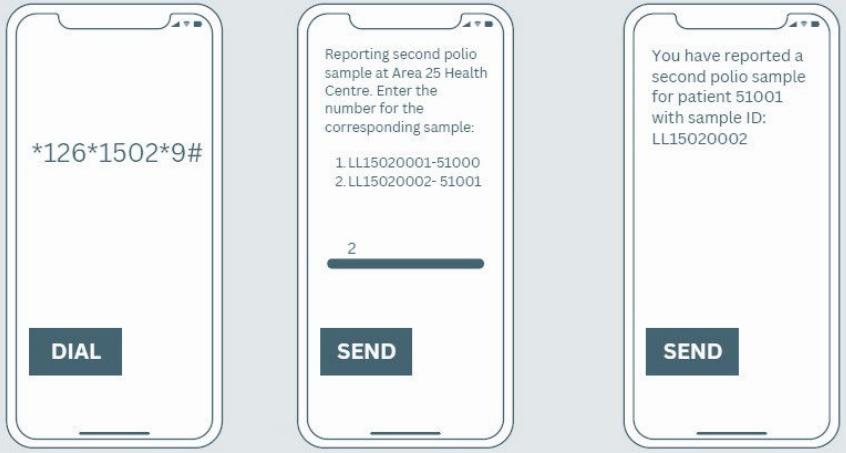
Responsible Partner

- - - Riders for Health
- - - SPEED
- - - WHO

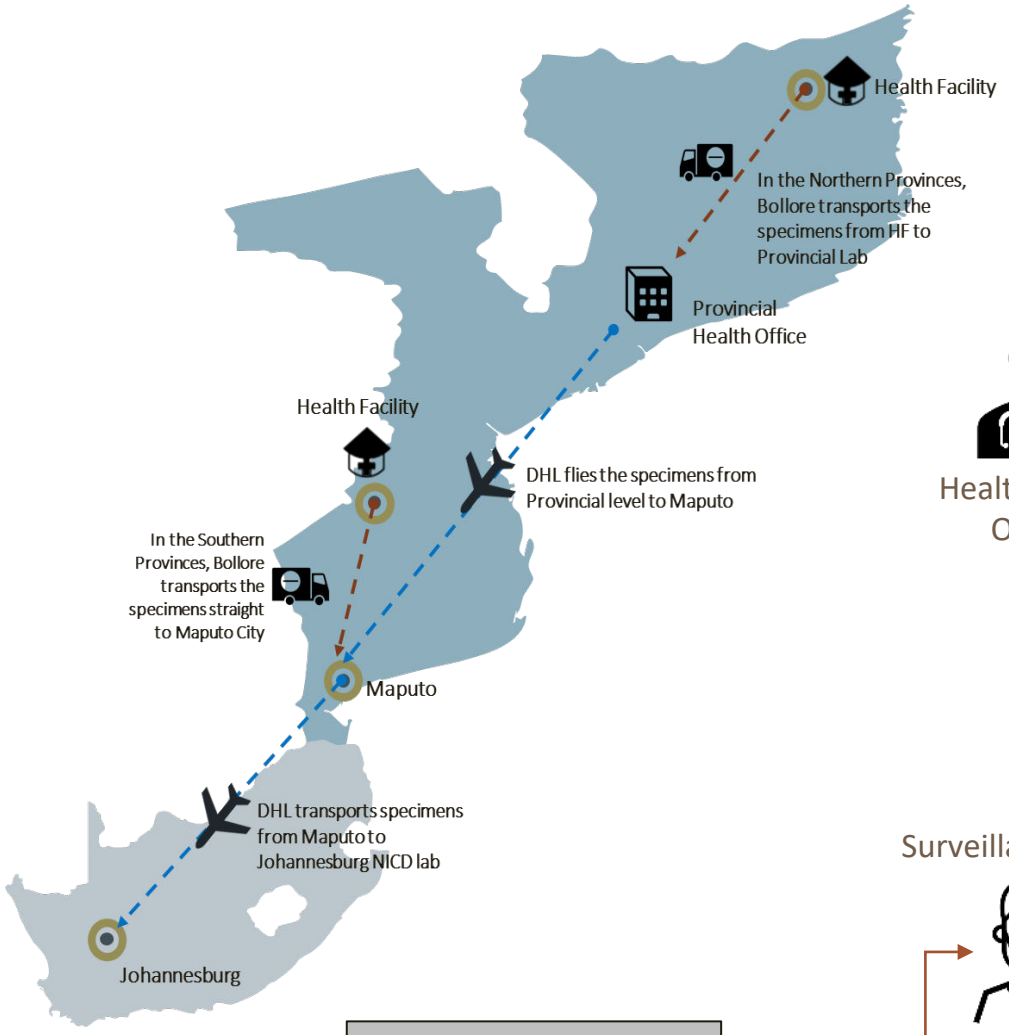


FIRST SAMPLE

SECOND SAMPLE



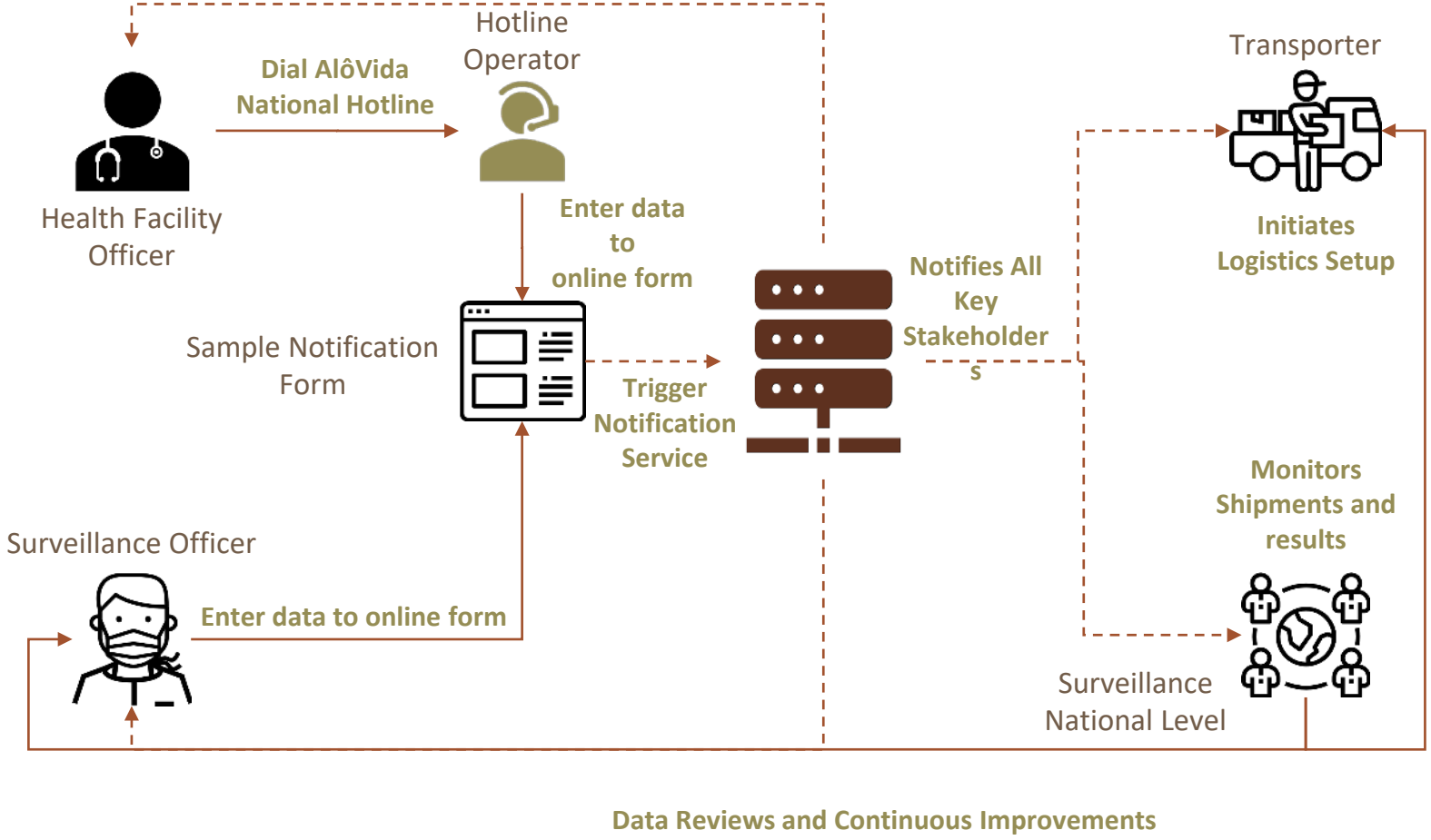
Mozambique: On-Demand Sample Transport Requests



Responsible Partner

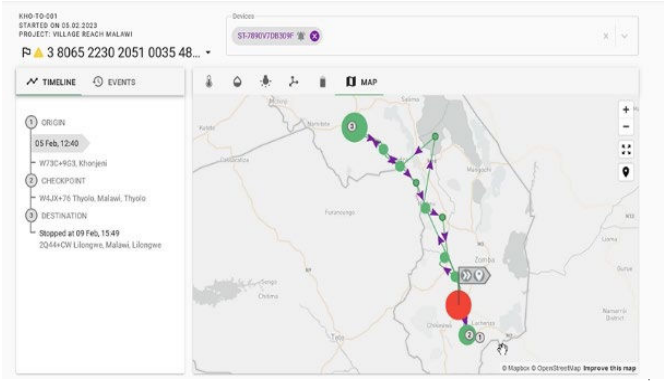
- - - AGL / VillageReach

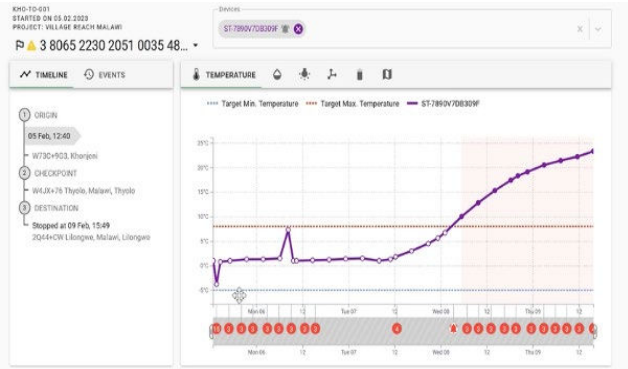
- - - WHO



Tec4med: Real-time sample location & temperature tracking

- Data is transmitted to and stored in the **cloud** for traceability
- Data collected on **Location, Route, Temperature**, Humidity, Light, Shock
- Potential to improve transportation efficiency with **real-time** monitoring
- Provides enough data to allow for sample and quality management while commodities are **in transit**
- Real time **alert** via SMS, Email and App via *Tec4Cloud* platform
- Ability to track & calculate **transit period** between hubs
- **Dashboards & maps**
- May allow tracking to **overseas labs** without the trackers leaving the country (by manually ending tracking at lab)

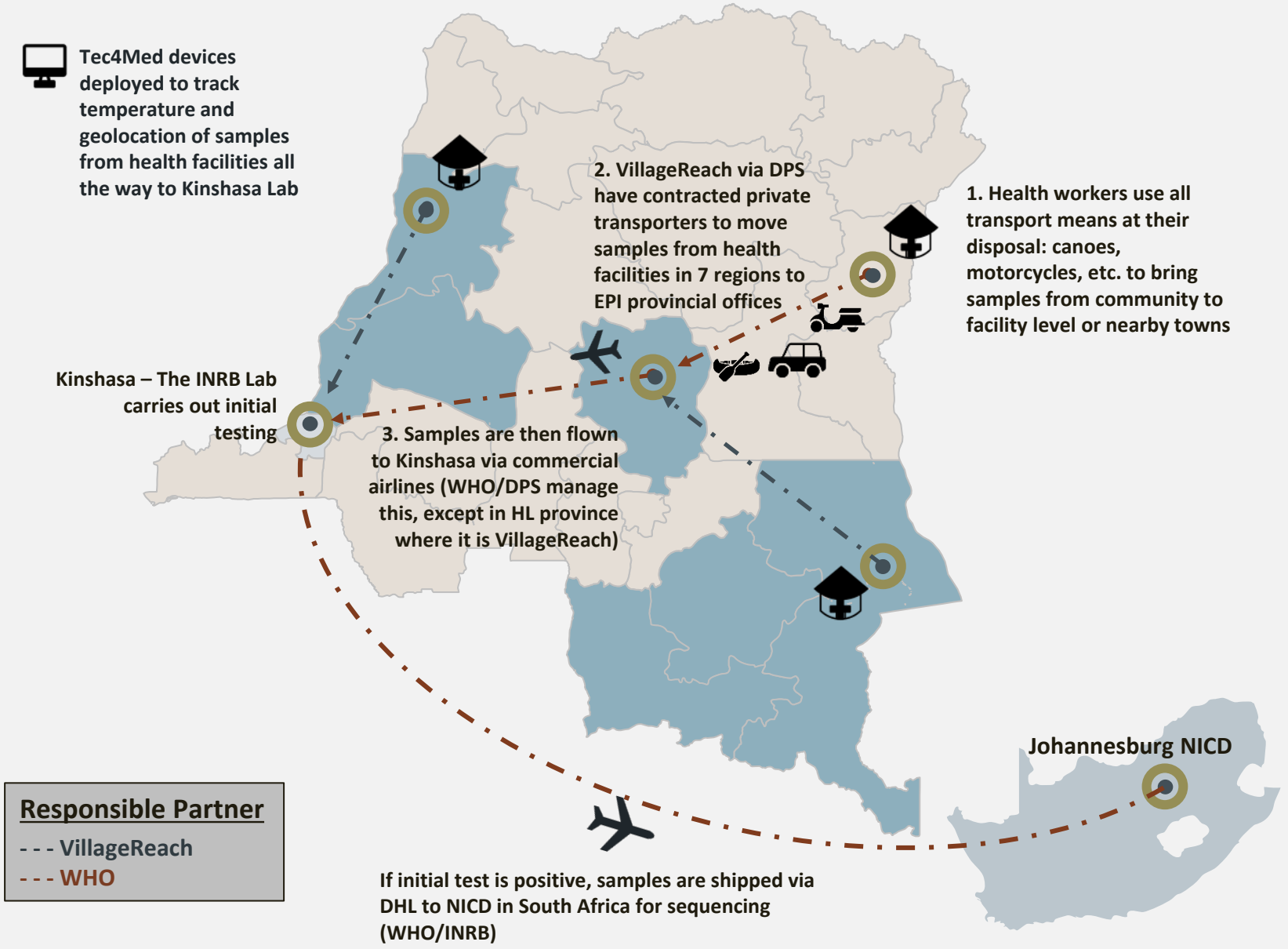




* DRC, Malawi, Mozambique: VillageReach project manager coordinates with MoH/provinces/districts + transporters to actively monitor data and act on it to solve delays, while samples are still in transit. Stakeholders have visibility & can verify data before reporting it further.

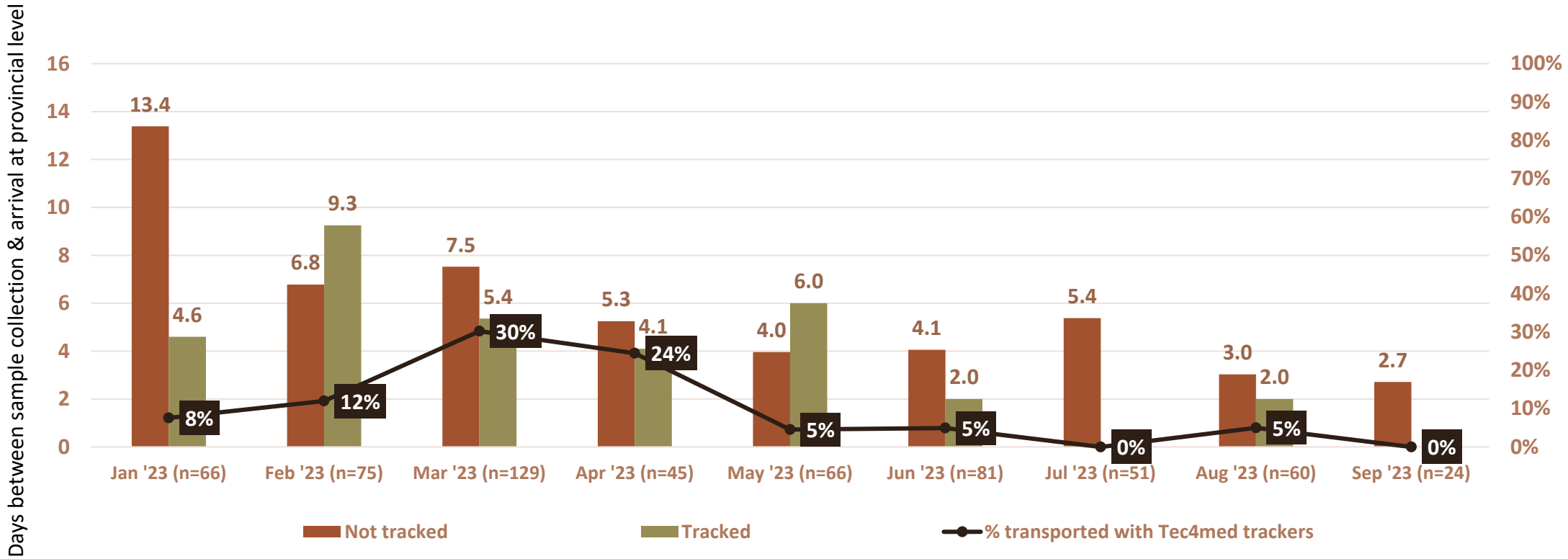
** More recently the devices were introduced in targeted areas of Chad and Cameroon and have been procured in Kenya by the MoH for use in refugee camps.

DRC: Tec4med helps to proactively correct issues during transport



- Dual-purpose Tec4med devices **piloted in 3 regions** to date: Haut Lomami, Tanganyika, Equateur
- Not all samples travel with trackers, but they have proven useful as an **educational tool,** to understand where **delays/** bottlenecks occur & to request ice pack changes when alerted about **temperature excursions**
- Dashboards support decisions in **route optimization** and ensure **adherence to transport SOPs**
- **Devices still require humans** to look at data & react fast if alerted (currently VillageReach staff)

GPS Trackers Contributed to Faster Sample Transport in one DRC Province



- 20% of AFP samples tracked with Tec4med devices in Haut Lomami province, DRC arrived within the required 2 days at the provincial transit point (Lubumbashi) after being collected from patients.
- AFP samples that were tracked averaged 5.4 days, which is 1 day faster than non-tracked samples.
- *Reasons why tracked samples took longer during some months:* Staff assigned to look at data & respond to alerts had competing activities; tracked samples were coming from more remote locations than non-tracked samples
- 99% of AFP samples tracked with temperature monitoring devices arrived at the lab in good conditions.

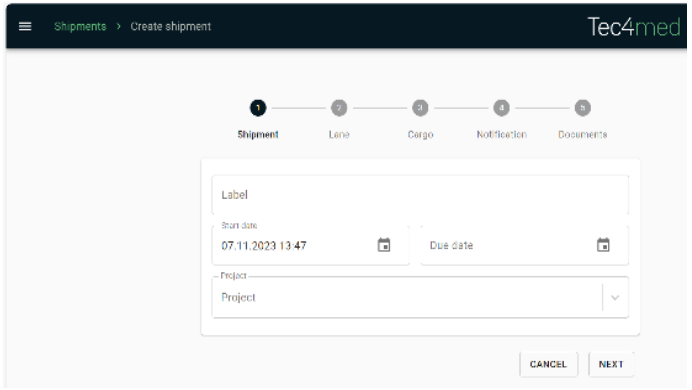
Tec4med in Mozambique: Tracking Process & Utilization Rate

1. Details of samples to be tracked are shared via email with transporter

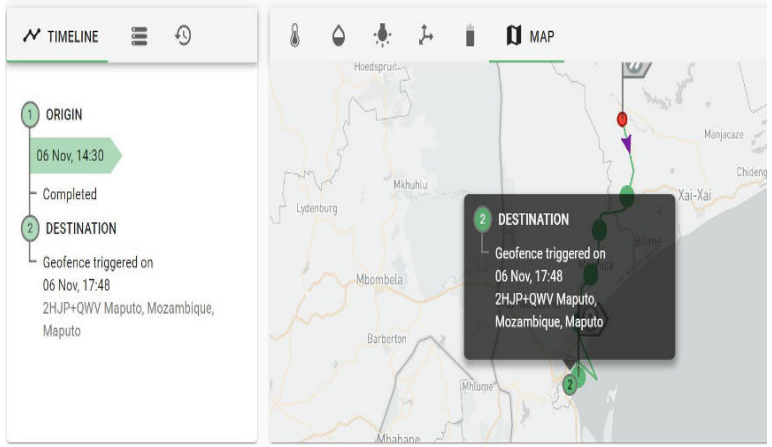
Foi registado um novo referenciamento de amostra da pólio com os seguintes dados:

Localização da Amostra	
Província	**Gaza**
Distrito	**CHOKWE**
Nome da Unidade Sanitária	**Cs Muzumuia**
Dados do Amostra	
Amostra	**Segunda amostra**
Tipo da Amostra	**Fezes**
Código da Amostra	**MOZ-GAZ-CHK-23-004**
Dados dos Técnicos da US	
Nome do técnico da US - Principal	**Teresa Sitoe**
Contacto Principal	**861075031**
Contacto Alternativo	**878810286**

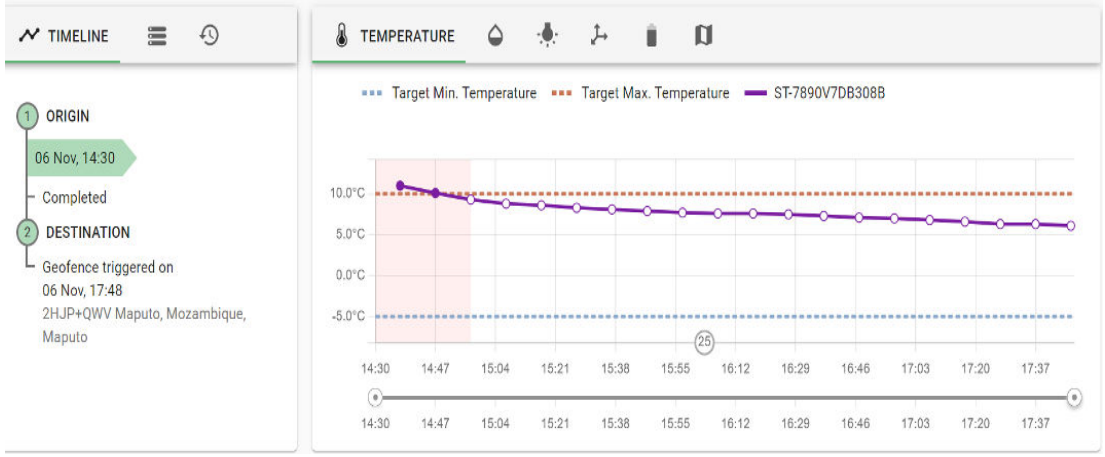
2. Shipment configuration in the platform



3. Shipment with real-time geolocation



4. Temperature monitoring

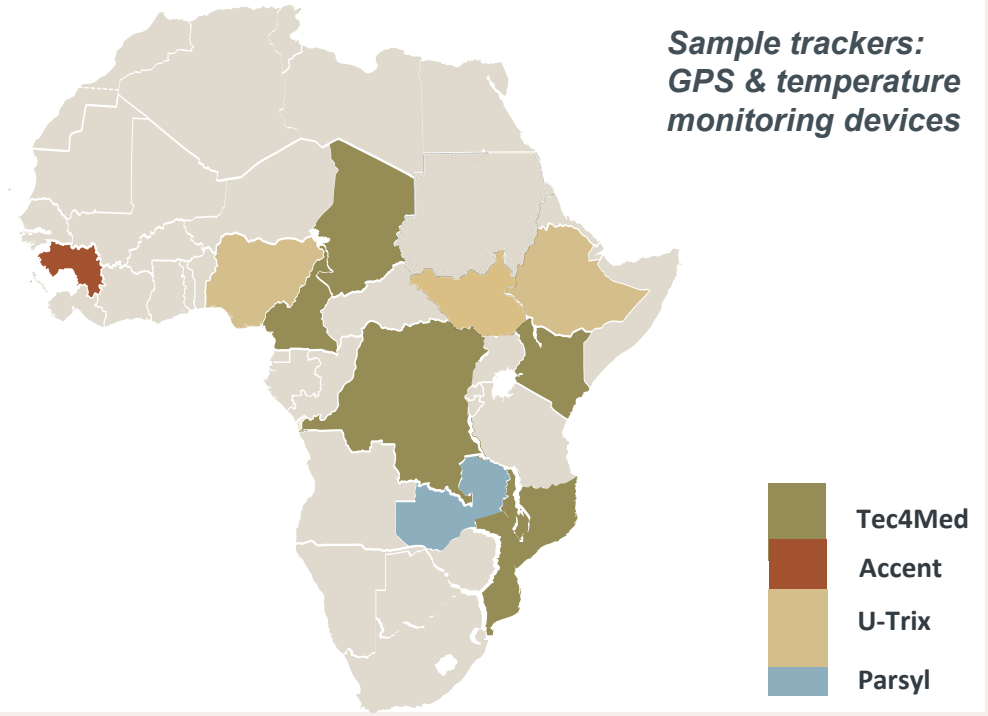


Regions	Provinces	# of AFP cases/contacts transported on routine (A)	# of AFP cases/contacts collected from HF's and transported **on demand** (B)	# AFP cases/contacts transported **on demand** using **Tec4med** devices (C)	% of AFP cases/contacts transported using Tec4med devices(C/B)
South	Maputo Cidade	14	12	9	75%
	Maputo Provincia	52	22	18	82%
	Gaza	69	52	28	54%
	Inhambane	45	38	23	61%
Center	Sofala	80	17	10	59%
	Manica	132	34	19	56%
	Tete	79	5	5	100%
	Zambezia	129	22	13	59%
	Nampula	111	19	16	84%
North	Cabo Delgado	86	31	22	71%
	Niassa	50	8	6	75%
	Total	**847**	**260**	**169**	**65%**

Different Countries, Different Data Systems

- **Ethiopia:** Digitized AFP Case Investigation Form - piloted by partner Project HOPE
- **Uganda:** PowerBI dashboards complementing RESTRACK, WebIFA
- **Guinea**: Tracking Echantillon - web-based, locally developed, utilized by partner FHI 360, integrated across diseases
- **Niger**: STElab - integrated across diseases, managed by partner Davycas
- **Mozambique**: VillageReach developing dashboard for MoH

Polio samples ready for transport in Uganda.
Photo credit Denis Onyodi for VillageReach



Successes

- Reimagined lab sample transport on-demand by introducing real-time **temperature monitoring** where none existed before.
- Identified gaps in **sample location tracking** and redesigned existing processes to generate more complete and granular data by transport segment; collaborated with MoHs & WHO.
- Enhanced health worker awareness and capacity for urgent sample transport, **data management** & proactive adjustments.

Challenges & Recommendations

- Slow adoption of any new information systems & gadgets, no matter how useful, due to many competing priorities for health staff > Constant reinforcement needed until use is mainstreamed.
- Recirculation of sample trackers is slower if devices must travel back-and-forth over long distances or by plane > Keep buffer stock of devices at different levels, to avoid running out.
- Cost isn't negligible > Account for ongoing subscriptions, replacement or repairs, and target devices to specific areas that have significant bottlenecks, using them as an educational tool.
- Almost half of tracked samples showed temperature excursions > While this ultimately didn't impact the arrival of samples in good condition at the lab, it required follow-ups by a human.

394
Shipments Tracked

193
Temperature Excursions Reported

98%
Samples arrive in good condition at Polio lab

Reflections

Digital Solutions for Lab Sample Transport

Improvements Attributable to Digital Solutions

- **Tec4med**
  - **real-time location tracking** helped to address bottlenecks & improve transport duration
  - **real-time temperature monitoring** helped with changing ice packs during transport
  - **maps** helped to track movements and validate sample transport routing used
  - **dashboards** helped to assess transporter performance and push for improvements
- **USSD System & AlôVida health hotline** helped with quick notification of availability of samples for collection and transportation

Solutions could be utilized for non-polio samples

- **Tec4med devices** could feasibly be used to track and monitor medical commodity distribution as well as the pick-up of other lab samples.
- They are useful for tracking time-sensitive products *but someone must be available to track, extract, and act on the data.*
- **USSD messages** can be sent for free by HWs (eliminating need for giving airtime to many individual users) and can be used to coordinate communication in general - to alert availability of samples, request transportation, and inform users on SOPs, changes in procedures and other notices.

Conclusions

Digital solutions:

1. The effectiveness of Electronic Sample Notification Systems is in enabling **faster notification and communication.**
2. Sample trackers provided vital visibility in sample movement, timelines, and quality by **monitoring sample travel conditions.**
3. Web databases/dashboards supported decisions in route optimization and improving sample transport SOPs.

Benefits observed:

- **Proactive addressing** of sample transport delays & detection of temperature surges.
- Progressive reduction in **transportation times** for polio samples.
- Increased sample **data availability, completeness & timeliness.**

Training for USSD sample notification system in Malawi. Photo credit: VillageReach

Thank You
SCAN ME
Photo credit: Riders for Health, Malawi