Polio Lab Sample Transport

Presentation to BMGF, 4 May 2023
VillageReach was brought on to assess the polio specimen referral systems and to co-design and implement customized solutions in 15 countries at high risk for polio outbreaks – aiming to improve the speed and quality of polio sample transportation from health facilities to national & international laboratories.

**Objectives & Geographic Footprint**

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Sub-objectives</th>
</tr>
</thead>
</table>
| **ACHIEVE COORDINATED & EFFECTIVE SAMPLE TRANSPORT SYSTEMS** | • Timeliness of sample transport  
• Quality of samples  
• Financing and sustainability  
• Governance & coordination |
| **IMPROVE SAMPLE TRACKING, DATA VISIBILITY & TURNAROUND OF LAB TEST RESULTS** | • Sample tracking  
• Data visibility & monitoring  
• Turnaround of lab test results |

Assessment completed (15/15)
National debrief completed (15/15)
Costed work plan co-developed with MoH, WHO + Implementation ongoing (14/15)

Program website
Start Up
Assessment tools design + Literature & Data review in 11 countries: DRC, Uganda, Guinea, Cameroon, Kenya, Ethiopia, Angola, Niger, Nigeria, South Sudan, Chad

Scope Expansion
Rapid assessments in 4 additional countries: Malawi, Mozambique, Tanzania, and Zambia

Implementation starts (rolling basis)
Customized solutions for the selected countries

Last countries start activities (minus Angola)
Nov-Dec 2022

Assessments Completed
All in-country and remote assessments and interviews completed

Decision Point
Preliminary work plans and budgets get green light, Project start-up begins with selection of in-country partners & transporters

Midline data review
JUNE 2023

Endline data review
Nov 2023

Reports & Transition of successful approaches
Approaches or innovations in sample tracking & transport transitioned to MoH (WHO)

Assessments

Start Up

Ramp Up
Training all Data Collectors, Revision, Customization, and Translation of Assessment Tool

Scope Expansion

Implementation

REPORTING

JUL 2022

AUG 2022 – NOV 2023

DEC 2023

Endline data review
Nov 2023

Last countries start activities (minus Angola)
Nov-Dec 2022

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Midline data review
JUNE 2023

Endline data review
Nov 2023

Reports & Transition of successful approaches
Approaches or innovations in sample tracking & transport transitioned to MoH (WHO)
Proven approaches

High trust relationships

Competent resources that are deployment ready

Scaling together with local partners

Innovative solutions that can be scaled
Timeliness of Polio Sample Transport: Ambitious Target

AFP stool samples

Environmental Surveillance (ES) samples

Polio labs are only at national or international level

3 Days
Example Country Specimen Referral Chart

<table>
<thead>
<tr>
<th>District</th>
<th>Provincial</th>
<th>National</th>
<th>International</th>
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<tbody>
<tr>
<td>Health Office</td>
<td>Provincial Health Office</td>
<td>EPI National Office</td>
<td>Int’l Airport</td>
</tr>
<tr>
<td>Community</td>
<td>Health Center</td>
<td>WHO</td>
<td>Int’l Airport</td>
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</table>

LEGEND
-AFP Specimens
-ES Specimens
-Pre-SRS Travel
-Results
-FTA Cards

Int’l Airport
Sequencing Lab
ES Site
District Health Office
Provincial Health Office
EPI National Office
WHO
Countries without in-country Polio lab have difficulty reaching the transport timeliness target, but many challenges still at the last mile.
## Polio Sample Transport: Interventions Customized by Country

<table>
<thead>
<tr>
<th>Country</th>
<th>TIMELINESS OF TRANSPORT</th>
<th>QUALITY</th>
<th>DATA</th>
<th>PEOPLE</th>
<th>EFFICIENCY</th>
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<td>Angola (TBD)</td>
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**Polio Sample Transport: Menu of Interventions (Mix, Match & Customize)**

<table>
<thead>
<tr>
<th>TIMELINESS OF TRANSPORT</th>
<th>QUALITY</th>
<th>DATA</th>
<th>PEOPLE</th>
<th>EFFICIENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport system (re)design</td>
<td>Govt health staff transport &amp; incentives</td>
<td>Commercial transporters (goal: speed &amp; reliability)</td>
<td>Supplies &amp; equipment</td>
<td>M&amp;E data review, systems</td>
</tr>
<tr>
<td>Level-jumping (skipping district or provincial stop) to minimize bottlenecks</td>
<td>HW incentives for case finding or transporting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instead of health staff transporting samples and leaving patients behind, use combination of HWs and private transporters</td>
<td>Incentives split more equitably among multiple HWs at facility, district level</td>
<td>Motorcycle-taxis, cars, minivans, public buses, postal service, boats, ferries, airlines + drones</td>
<td>Sample carriers</td>
<td></td>
</tr>
<tr>
<td>Switching from routine/fixed routes/infrequent to on-demand/direct routes/urgent transport</td>
<td>Immediate payment upon sample delivery (avoid delays)</td>
<td>Local transporters (i.e. up to district) and/or bigger couriers (i.e. district to capital)</td>
<td>Triple packaging + Collection kits (AFP, ES)</td>
<td>Support to MoH to add indicators that track transport</td>
</tr>
<tr>
<td>Route reconfiguration (shorter routes instead of health admin hierarchy)</td>
<td>Mobile money payments for HWs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switching from ground to air transport</td>
<td>HWs hand over to transporters</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Integration of transport across different types of lab samples (polio samples still treated as urgent)</td>
<td>In areas without phone/internet, couriers may reimburse HWs</td>
<td></td>
<td></td>
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<tr>
<td>Pilot projects in select areas that test the above</td>
<td>Trained on biosafety &amp; proof of delivery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TA for creation of new ES sites or regional sample reception stations</td>
<td>Performance-based contracts (timeliness bonus or penalties)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TA for**

- Programming of polio indicators into HMIS (i.e. DHIS2)
- National strategy on integrated lab sample transport
- Decentralize transport to local govt's

**And for**

- Polio transition plan workshops
- TA for community sensitization, case finding
- Use of low-cost, low-tech interventions (whatsapp) for results
- National strategy on integrated lab sample transport
- TA for community sensitization, case finding
- Use of low-cost, low-tech interventions (whatsapp) for results

**And for**

- TA for training on integrated lab sample transport
- TA for community sensitization, case finding
- Use of low-cost, low-tech interventions (whatsapp) for results
- National strategy on integrated lab sample transport
- TA for community sensitization, case finding
- Use of low-cost, low-tech interventions (whatsapp) for results
Despite customized interventions by country, the program goals are the same

**Theory of Change:** Rapid viral detection ➔ Faster outbreak response ➔ Faster containment of virus ➔ Eradication

**Problem:** Polio lab sample transport is slow and unreliable, resulting in a delayed outbreak response.

**Root causes:**
- Polio stool specimens must be transported immediately and cannot wait for scheduled pick-up times of other samples.
- Health workers are required to transport samples but often lack the time and finances to do so, especially given geographic conditions.
- Specimens require cold chain, which is limited.
- It is hard to predict where suspected cases of polio will present across the health system, and it is not cost-efficient to establish a traditional standalone transport network.

**Activities**
- Coordinating in-country partners to improve polio sample transport systems.
- Build the knowledge and skills and provide the equipment needed to deliver quality samples.
- Create or enhance digital data tools and dashboards for real-time sample tracking and notification of results.

**Outputs**
- Partners operate improved polio sample transport systems.
- Transporters adhere to polio sample quality protocols.
- Transporters track samples and notify results electronically.

**Outcomes**
- Polio samples are transported in a timely manner.
- Polio samples arrive in good condition.
- Transport bottlenecks are continuously identified and addressed.

**Impact**
- Polio is detected and contained more quickly and more reliably in high-risk countries.
- Polio is eradicated.

**Assumptions:**
- The health system will continue to detect cases of polio in a timely way through active surveillance and community-based detection.
- Ministries of Health will provide VillageReach and its partners reliable, timely data on polio sample transport to enable analysis of transport bottlenecks.
- World Health Organization will continue its ongoing, funded work complementary to transport improvements.
- Government officials will remain available to partner in polio lab sample transport improvements.
Country Examples:
Early lessons & results
### AFP & ES Sample Transport: 2022 Indicator Summary

<table>
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<tr>
<th>Indicator</th>
<th>2022</th>
<th>2022</th>
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<tbody>
<tr>
<td># of days between sample collection and testing lab</td>
<td>2.6</td>
<td>1.7</td>
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<tr>
<td>% of samples delivered in less than 3 days</td>
<td>82%</td>
<td>90%</td>
</tr>
<tr>
<td>% of samples in good condition</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td># of samples delivered to lab</td>
<td>20,792</td>
<td>2,218</td>
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</table>

#### VillageReach interventions:
- Trainings with MoH for all states (completed), cascading down to all levels of health system now
- Procured temperature monitoring devices for select areas
- Pilot project with MoH only in areas lagging behind: use of R4H to do transport, instead of health workers

Nigeria: A country already performing well overall

- 3-day transport target met
- 80% sample condition target met
7 provinces (116 districts): Transport routes optimized, allowing polio samples to skip administrative levels and reach the provincial capital/transit point faster; shorter routes & transporters mapped (DPS and WHO then manage air transport to the Kinshasa INRB Laboratory).

2784 health workers & transporters trained in biosecurity and polio sample transport, including the new SOPs

10 contracts signed between the 7 DPS and private transport agencies (that manage the local transporters); contracts were drafted by VillageReach’s Outsourced Transportation Resource Center (BMGF-funded)

7 MoUs signed with the DPS to allow VillageReach to pay the private transporters as soon as invoices are submitted

Private transporters advance funds (reimburse health workers) in hard-to-reach areas or areas without mobile connectivity, when health workers bring samples to them
Main features

- 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 and reduce products loss 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 and calculate **transit period** between hubs
- **Dashboards & maps**
- Can allow tracking to **overseas labs** without the trackers leaving the country (by manually ending tracking at the overseas 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. WHO and stakeholders have visibility & can verify data before reporting it further.
Mozambique: Alo Vida hotline for on-demand transport requests

1. Call hotline: 84146 / 82149 / 1490
2. Update Sample Data
   Updates sample pickup request information
3. Sends Notification:
   Email, SMS and Telegram
4. Coordinate
   Coordinates internal processes and ETAs
5. Coordinate
   Coordinates internal processes and ETAs
6. Reach out to Transporter
   Checks on ETAs and controls timely sample pickup
7. Create Shipment
   Pickup Samples and create shipment on system
8. Live Sample Tracking:
   SMS, Email and Web Portal

HF Manager
AlóVida Operator
Surveillance Focal Point (Provincial)
Surveillance Focal Point (MoH)
Transporter BT&L
Tec4Med Tracking Devices

Manual Process
Automated Process
**AFP Sample Transport: routine & on-demand**

Average # of days from sample collection to reception at Faculty of Medicine (Maputo)

- **4 South provinces**
  - Avg: 7.9 days (n=32)
  - Routine (n=14): 2.6 days
  - On-Demand (n=25): 3.3 days

- **All 11 provinces**
  - Avg: 12.7 days (n=221)
  - Routine (n=134): 13.3 days
  - On-Demand (n=42): 5.4 days

- **7 North/Central provinces**
  - Avg: 13.6 days (n=189)
  - Routine (n=120): 14.5 days
  - On-Demand (n=17): 9.2 days

Routine: USAID Amostra/Bollore
On-Demand: BMGF/VillageReach/Bollore
Malawi: Notification, transport & data reporting improvements

Baseline, 2022 (501 samples)
- AFP sample collection → District health office → Lilongwe
  - ~11 days

National, Jan-Mar 2023 (117 samples)
- AFP sample collection → District health office → Lilongwe
  - 2.2 days

Courier, Jan-Mar 2023 (18 + 42 = 60 samples)
- AFP sample collection → District health office → SPEED → Lilongwe
  - ~12hrs, 6.5 hrs, 11.8hrs, 12.2hrs
  - ~38.5 hrs (2-day target to nat’l level)

Responsible Partner:
- R4H
- SPEED
- WHO
Malawi: Tec4Med real-time sample & temp tracking
Malawi: Facilities notify samples daily via USSD phone system

<table>
<thead>
<tr>
<th>District</th>
<th>Facility</th>
<th>Sample</th>
<th>Type</th>
<th>Reported</th>
<th>Reporter</th>
<th>Date</th>
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<td>POLIO</td>
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Malawi: Fixing data a pre-requisite to fixing sample transport

AFP Sample Transport

Average # of days from sample collection (community/health facility) to Lilongwe only

Although data availability between Lilongwe and NICD is very limited, VillageReach has worked with EPI to improve data availability through Lilongwe.

• This data demonstrates a reduction beginning in Oct 2022, when both WHO and VR interventions started.
Tanzania: Filling community surveillance gaps

Goal: Improve timeliness of polio sample transport; quality of polio data; and ensure sustainability

In-country implementer: Center for International Health, Education, and Biosecurity (CIHEB) of the Institute of Human Virology, UMB

BOTTLENECKS IDENTIFIED DURING NATIONAL ASSESSMENT IN 2022

- Expensive transportation system, including travel and per diems for health workers (HWs) to hand-deliver samples
- Constrained human resources and inadequate training on handling and transporting specimens
- Data quality issues and delays in processing samples at national level for shipment to UVRI lab

KEY SOLUTIONS CO-DESIGNED WITH MOH, WHO, IN-COUNTRY PARTNERS

- Pilot a courier-delivery system in Tabora region to transport polio specimens from district to national level
- Conduct targeted training for surveillance focal persons and HWs; sensitization meetings for traditional healers on polio surveillance; and printing of job aids
- Quarterly data monitoring and feedback meeting; support for the national sorting center for packing and processing of polio samples

MAP: Local CHW hand-carries specimens to MOH in Dar es Salaam, stopping at regional level along the way when needed. DHL transports specimens from Dar es Salaam to UVRI Reference Lab in Uganda. DHL transports specimens from UVRI to Johannesburg NICD lab. UVRI does initial polio testing. If possible, specimens are forwarded to sequencing lab.
Kenya: Eyeing integration & sustainability post 2023

Goal: Improve HW capacity and provide needed supplies; local govt’s take ownership of relationship with private transporters (for sustainability); advance on integrated lab sample transport strategy and SOPs; improve end-to-end visibility of sample management (digital solutions)

In-country partner: Kenya Ministry of Health, who in turn contracts polio sample transport to private transport company G4S

**BOTTLENECKS IDENTIFIED DURING NATIONAL ASSESSMENT IN 2022**

- Weak coordination structure at county and sub-county levels to support performance
- Shortage of primary sample collection containers at facility level though improvisation is done by staff
- Lack of visibility into lab results and return process at lower levels (although phone/email communication is done)

**KEY SOLUTIONS CO-DESIGNED WITH MOH, WHO, IN-COUNTRY PARTNERS**

- Trainings for County lab coordinators (CLCs) and County Disease surveillance coordinators (CDSCs); support for surveillance TWG to develop SRS integration SoP; scaling up PSE for specimen transport
- Procure and distribute sample collection containers
- Identify, develop, test and deploy an app to track sample shipment (to be confirmed)
Guinea: A country where indirect influence (TA) led to big gains

### AFP Sample Transport: By Month

**Average # of days from collection (health facility) to int’l lab (Institut Pasteur, Dakar)**

<table>
<thead>
<tr>
<th>Month</th>
<th>Baseline period (22.4 days)</th>
<th>Program period (7.5)</th>
<th>Indicator Baseline Program</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sample condition</td>
</tr>
<tr>
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<td>Data completeness</td>
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#### Baseline period (22.4 days)

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#### Program period (7.5)

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<td>Sep '23</td>
<td>13.2</td>
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<tr>
<td>Oct '23</td>
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<td>Nov '23</td>
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<td>Dec '23</td>
<td>13.7</td>
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**Target: 3 days**

### Indicators

- **Sample condition**: Baseline 94%, Program 100%
- **Data completeness**: Baseline 81%, Program 90%
Components Assessed

1. Specimen Referral System Management
2. Financing
3. System Design
4. Transport & Logistics
5. Equipment & Supplies
6. Training
7. Data Systems

DIAGNOSTICS NETWORK

- Program Management
- Policies & Planning
- Quality Management
- HR/Training
- Specimen Referral System
- Biosafety
- Equipment Management
- Waste Management
- Connectivity
- Data Systems
- Procurement & Supply Management
- Testing Platforms
Assessments & Co-design of Implementation Plans

<table>
<thead>
<tr>
<th>Phase</th>
<th>Objectives</th>
<th>Description</th>
<th>Dates</th>
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|       | **NEEDS ASSESSMENT IN 15 COUNTRIES**  
Identify sample transport bottlenecks and other pertinent challenges in each of the focus countries | ✓ Engage with BMGF Polio team & WHO AFRO  
✓ Contracting & training of consultants (10 agreements)  
✓ Data & literature review for each country  
✓ Design of quantitative and qualitative assessment tool  
✓ In-country or remote assessments (national, provincial, district, health facility/community level) | Nov 2021-Jan 2022  
(design/planning/training)  
Feb-June 2022  
(assessments) |
|       | **SOLUTION & GEOGRAPHY SELECTION**  
Recommend solutions, including innovations when appropriate, and process improvements - customized to specific countries’ needs | ✓ Findings presented to BMGF and AFRO (rolling basis)  
✓ National debriefs/co-design of solutions ➔ Reports  
✓ Costed Implementation roadmaps ➔ Work plans  
✓ Align with global priorities & country action plans | May-Sept 2022  
(most countries by July 2022) |

Who participated in the assessments, national debriefing meetings, and co-development or work plans?

- Ministries of Health, EPI/Surveillance/Disease Control Programs, National (and int’l) laboratories
- Provincial, district/county health departments + (C)HWs *(assessment mainly)*
- WHO country offices + WHO AFRO
- BMGF consultants in countries + BMGF Polio team *(depending on country)*
- VillageReach staff in Malawi, Mozambique, DRC, Tanzania, Kenya, Nigeria + Cote d’Ivoire, SA, USA
- Independent consultants & partner organizations *(depending on country)*
Emergency program = Same VR principles, but on condensed timeline

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<tr>
<th>Phase</th>
<th>In each country...</th>
<th>...and overall</th>
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<tr>
<td></td>
<td>▪ Conducted assessment to identify <strong>specific weaknesses</strong> in each country’s system</td>
<td>▪ Identified <strong>potential in-country partners</strong> where VillageReach didn’t have a presence on the ground</td>
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<td>▪ Conducted <strong>national debrief meeting</strong> and <strong>extensive co-design of solutions</strong> with MoH, WHO, stakeholders</td>
<td>▪ Vetted, interviewed and selected a local partner organization to fit the scope of work (11 partners total)</td>
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<td>▪ Co-developed <strong>costed implementation plan</strong> with a focus on filling gaps that others weren’t planning to fill (complementary work plans to WHO or other donors)</td>
<td>▪ Negotiated and <strong>contracted</strong> with the partners</td>
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<td>▪ We followed the lead of the country for the changes they wanted to make: Countries with a more mature polio SRS requested less funding &amp; more targeted support; countries with a less mature SRS requested more comprehensive or more innovative approaches</td>
<td>▪ Partner was onboarded and introduced to MoH, WHO if new; this led to some further <strong>work plan refinements</strong></td>
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<td>▪ <strong>Every country’s work plan is different</strong>; in most countries, VillageReach supports/manages/funds only a portion of the polio sample transport &gt; thus, it is critical to collaborate closely with WHO due to need to jointly achieve the 72 hour target from collection to lab</td>
<td>▪ Same process was followed for <strong>private transporters</strong> in each country that decided to start using them</td>
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<td>▪ VillageReach has a more <strong>direct implementer</strong> role in some cases, and a <strong>technical assistance (advisory)</strong> role (to MoH and WHO) in other cases &gt; We control some transport &amp; data interventions, but not all</td>
<td>▪ <strong>The VillageReach model</strong>: Everything we do is in support of the government, aiming to strengthen national (transport &amp; data) systems and to transition successful approaches and best practices to the gov’t</td>
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<td>▪ <strong>Transition to gov’t</strong> doesn’t mean that the gov’t has to implement the intervention after VillageReach exits; Gov’t could own the process, but another private or public entity could manage the work day to day</td>
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## In Summary: Polio Lab Sample Transport Program to Date

<table>
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<tr>
<th>Top things we’re proud of</th>
<th>Main challenges</th>
<th>Next steps</th>
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<tr>
<td>• Comprehensive <strong>assessments in 15 countries</strong> + cross-country report submitted to BMGF, AFRO</td>
<td>• Progress slowed down during the <strong>consensus-building stage</strong> with MoH, WHO, partners – but buy-in and meeting country needs are critical</td>
<td>• Midterm data review planned for June</td>
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<td>• National de briefs in 14 countries &amp; costed implementation plans developed in collaboration with MoH, WHO and in-country stakeholders</td>
<td>• Many countries continued to <strong>refine the work plans</strong> activities through Dec-2022 (some changes still made in Jan/Feb)</td>
<td>• Final data review planned for Nov: will guide planning for transition of successful interventions after Nov</td>
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<td>• Program is “locally-driven &amp; globally-connected”: all solutions initiated in country, but learnings across countries</td>
<td>• ‘Surge funding’ to complement WHO funding; we provide TA but don’t directly impact all polio sample transport</td>
<td>• Cost analyses of VillageReach (private &amp; public) transport and digital solutions interventions</td>
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<td>• Program encourages entrepreneurship in Africa and a focus on speed and efficiency</td>
<td>• ‘Change management’ takes time, but positive changes will impact the system</td>
<td>• Angola MoH and WHO have revived discussions for implementation in Apr 2023: Work plan development in May</td>
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<td>• Public &amp; private resources used in combination for the public good</td>
<td>• Vetting of partners &amp; contract negotiations with transporters took longer than expected; time-consuming for our program &amp; finance teams</td>
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<td>• Digital solutions (sample tracking apps vetted, selected &amp; being deployed)</td>
<td>• Found <strong>good expertise in country</strong> that can help govt’s beyond this program</td>
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<td>• Strong network of over <strong>35 in-country partner</strong> organizations, transporters built over 5 months</td>
<td>• Assessment focused mainly on <strong>transportation bottlenecks</strong>, but gave an early hint as to the ‘data problems’ in some countries</td>
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<td>• Activities started in <strong>14 countries</strong> by end 2022</td>
<td>• Collecting full data since then has been a challenge in a number of countries (multiple databases, understaffed MoH, missing data, or data not shared)</td>
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<td>• Complex interventions, customized by country, laid building blocks for change</td>
<td>• Date of arrival at labs &amp; sample quality (lab data) needs improvement at times</td>
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<td>• Working to obtain and improve data</td>
<td>• Some early promising results</td>
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