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Using Technology for Improving Vaccine Delivery in Mozambique

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Problem: Need for end-to-end temperature monitoring visibility

75% of vaccines freeze before they get to clinics



- Without adequate monitoring, countries and governments know very little about the effectiveness of vaccine transport in practice.
- There is no source consolidating temperature, transport, and storage data to assess the effectiveness of the overall transport system.

The Technology: The Pilot Journey

The Ministry of Health of Mozambique in collaboration with VillageReach and Nexleaf Analytics is piloting an innovative Bluetooth-enabled logger device called **Trek** to monitor the vaccine cold chain during transport in the Maputo Province. This is a 9-month project.

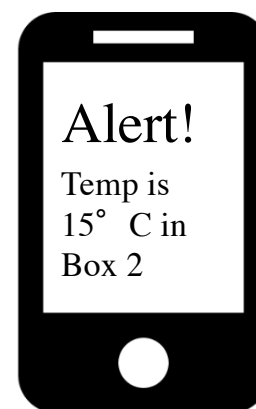
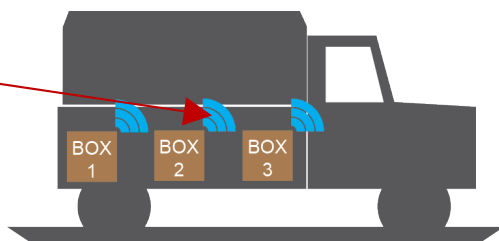
The objective of this pilot is to:

- a) provide visibility into existing cold chain challenges during transport;
- b) strengthen processes around distribution and packing;
- c) inform decision-making at provincial and national levels for cold chain management to ensure vaccine potency
- d) document the lessons learned and implementation model for vaccine transport monitoring.

The Technology: Temperature Monitoring for Transport

Trek is a Bluetooth-based data logger for monitoring temperature of the vaccine storage equipment during transport. The GPS-enabled Trek can monitor temperatures in vaccine carriers during transportation, providing visibility into carrier and cold boxes, and informing best practices and route planning. The logger works with an Android app to transfer onto a phone or tablet.

Sensor is placed in each cold box in the distribution vehicle to sample the temperature continuously during the trip .



The driver receives a notification on his/her phone when there is a temperature excursion during transport.

Temperature data transmitted to the driver's phone through Bluetooth function

The Technology: Alerts and Dashboard

- Trek provides **continuous temperature monitoring data during transport**
- With real time data collection, we can **send alerts** to key personnel during transport and enable personnel to act immediately in response to hazardous temperatures
- The data consolidated from the driver's phone on temperature, routes, pickup, and delivery times is accessed on a secure, user-friendly dashboard.
- The data can be viewed by managers at any given time and in real-time as the journey is in progress.
 - ✓ It enables distribution team to keep track of their reportable information in addition to all the current paperwork of temperature data.
 - ✓ The data from the dashboard can be integrated into other data management systems in the country to provide end to end visibility on transport and storage of vaccines.
 - ✓ Data visualizations enable supervisors to identify procedural refinements to transport vaccines more reliably--responding to areas with high volumes of failure incidents

Phase 1: Needs assessment and sensor placement (July-Sept 2017)



Key Learnings:

1. Sensor placement for heat and freeze sensitive vaccines.
2. Train users on the device and analytics interface and iterate on the sensor design based on their feedback.
3. Ensuring the data is presented clearly in the phone application for distribution team to see.
4. Language customization of the phone application and alerts.
5. The importance of showing the regions with alerts on the map
6. Challenges with the technology hardware and firmware and the need for iteration on the design.

Phase 2: Baseline data collection (present-Jan 2018)

1. Provide the MOH with a baseline on current temperature conditions during transport.
2. Create and test SOPs around how data should be used by users during transport for proactive monitoring (roles of drivers, managers, distribution team in handling vaccines).
3. Spec out and test customizations and analytics dashboard to meet the needs of users in transport such as cold chain managers.

Phase 3: Post-implementation phase (Feb-April 2018)

1. Use SOPs to respond to alerts during transport.
2. Inform packing and protocol during distribution to reduce and prevent temperature excursions from happening.
3. Data-driven report on the most common temperature problems in transit. Potential for data mapping of which routes/areas experienced the highest rate of alarms to inform trip duration and route planning.
4. Provide recommendations for an implementation model.
5. Calculations of the total cost of ownership for temperature monitoring during transport.

Potential Findings of the Pilot

- What are the practices that lead to freezing/overheating of vaccine during transport?
- What is the impact of packing practices on heat and freeze sensitive vaccines (what changes are required to further protect potency)?
- What is the most efficient and effective flow of information to protect vaccine potency: including both appropriate information systems; information availability to MOH staff; and Standard Operating Procedures (SOPs) to act on this information.
- What are the top four use-cases for data used for strengthening cold chain practices before and after transportation?



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