TechNet-21
The Technical Network for Strengthening Immunization Services

Passive Vaccine Storage Device Study in Senegal

Lessons from Using Long Holdover Passive Storage Devices at the Last Mile

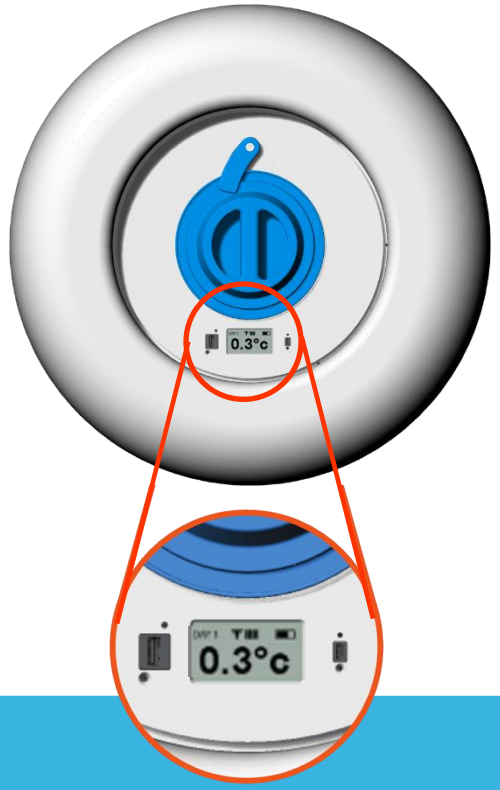
Ministère de la Santé

globalgood
Idea by INTELLECTUAL VENTURES

PATH

Background & Presentation of the device

Device presentation exterior



Overall diameter: 51.8 cm

Overall height: 72.1 cm

Neck length: 20.3 cm

Neck diameter: 12.7 cm

Vaccine storage: 5 L

Ice capacity: 8.6 Kg

Rated weight: 31.8 Kg

Device presentation interior

Cross section view

Ice-pack arrangement

Study descriptions

In 2011, PATH, Global Good, and the Senegal Ministry of Health partnered to evaluate the passive vaccine storage device in Senegal. The study was conducted in two phases

phases	Objective	Number of sites	Start date	End date
1	Evaluating the durability and temperature hold time of a passive vaccine storage device (PVSD) in Senegal.	6	Feb. 2013	April 2013
2	Conducting a comparative evaluation of the fully burdened costs and performance of deployment of a PVSD in static and mobile vaccine delivery settings in Senegal.	12	Dec. 2013	July 2014

Abbreviation: PVSD, passive vaccine storage device.

Selecting a site

The site-selection was based on the following criteria:

- **Power availability.** The health post could not be connected to grid electricity or undergo recurrent power cuts.
- **Population.** The population covered by the health post should not exceed 6,000, which would represent a target EPI population of 250 children and corresponds to the 5 liter vaccine storage capacity of the device.
- **Connectivity.** The health post had to have telephone-network coverage (i.e., SMS or mobile phone to help supervise the operations of the device).
- **Human resources.** Ideally the health-post staff had to be highly professional and committed.
- **Management of freezing.** The health post had to be located in a district where the supplying warehouse/pharmacy could manage the ice-pack freezing process (e.g., grid electricity and a power generator, support staff, freezer).
- **Transport.** Health care workers had to have transportation (public or private) enabling them to transport the device (e.g., via vehicle, motorcycle, animal-driven cart).

Abbreviations: EPI, Expanded Programme on Immunization; SMS, short-message service.

Study - Phase 1

Road test results for two devices

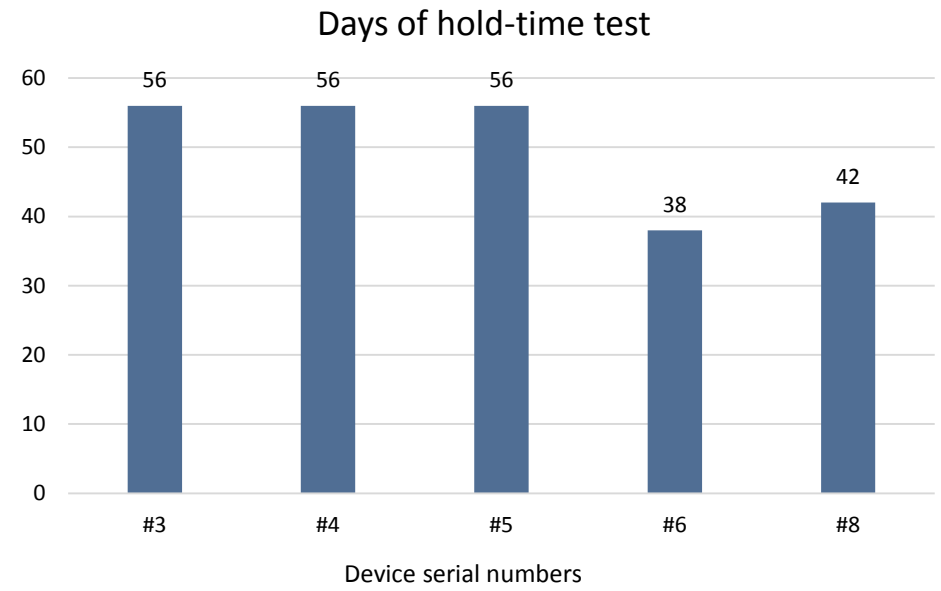
Major goals were met:

- **No broken vaccine vials.**
- **No frozen vials.**
- **No change in thermal performance.**

There were minor issues:

- **Minor scuffing (#1).**
- **Broken stack handle (#2).**

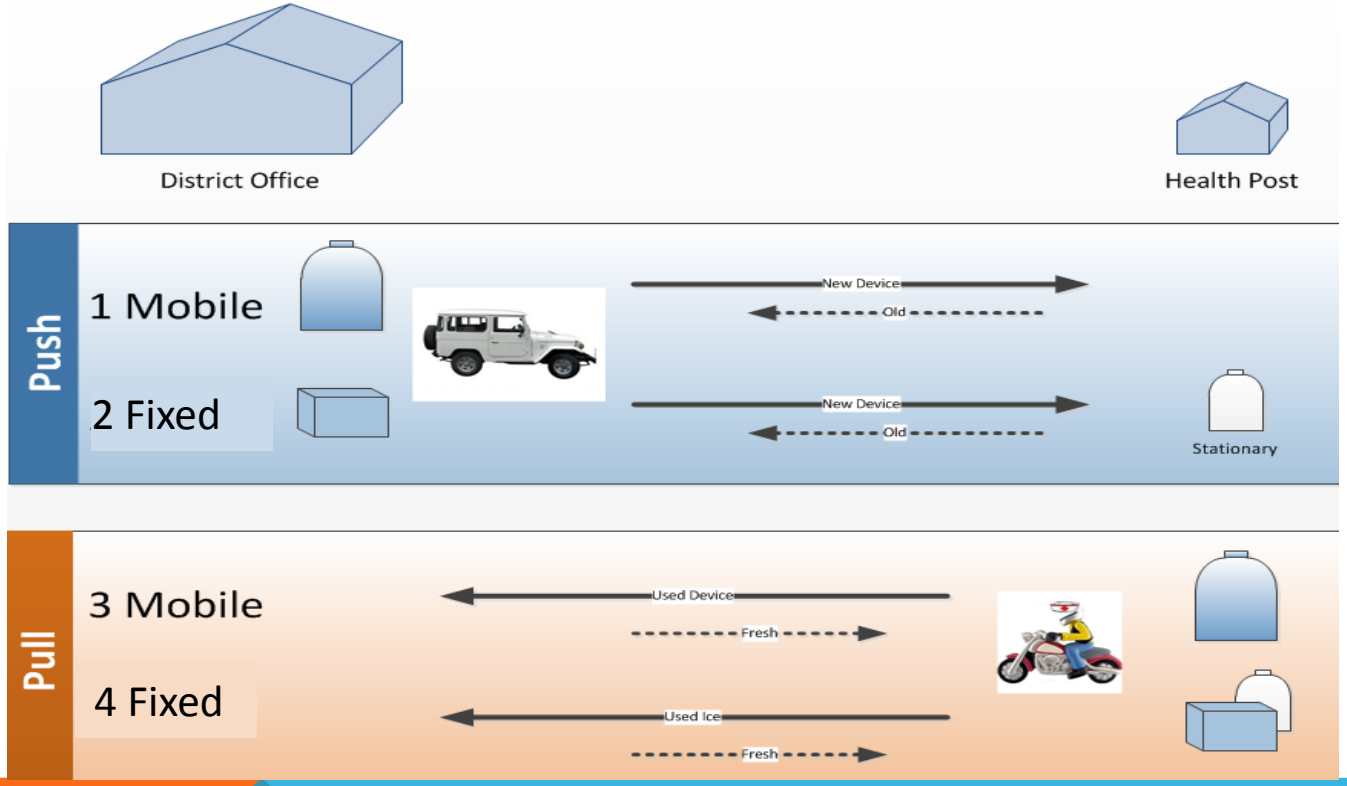
Hold-time results for five devices in Saint-Louis



Day/night	Hold temperature	Hold duration
43°C/25°C	0°C to 8°C	38 days
32°C/15°C	0°C to 8°C	56 days

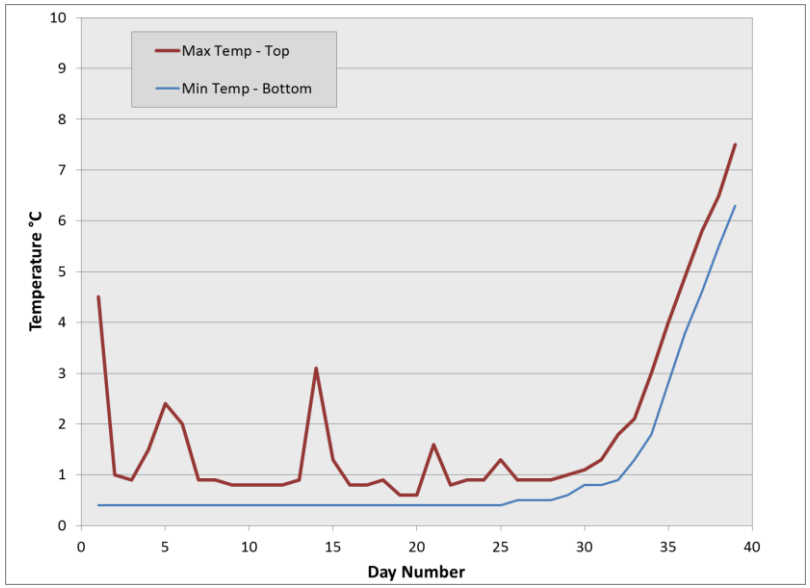
Study - Phase 2

Use cases: Push and pull systems



Hold time results

Temperatures measured over a typical cycle



Maximum (top) and minimum (bottom) temperatures measured over a typical cycle.
This unit was taken from SN 40 deployed in Saint-Louis Region. Even on high-usage days the maximum temperature does not rise above 3.0°C until near the end of its cycle.

During Study 2, our results show that the thermal design meets the needs of each of the 12 locations: from cool coastal health posts to the much warmer remote inland locations on the edge of the Sahara. This was true in the early winter months and in the hot summer months of May and June.

Other data were collected including: external temperature, battery-charge level, number of times opened, total duration of open time, and GPS location.

Abbreviation: GPS, global positioning system.

Test locations: Saint-Louis Region

	Fixed	Mobile
6 health posts	Tassinere Niassene Gaé	Namarel Mbiddi Ndiayene Peulh
Health post equipment (Installed by PATH)	2 Dometic RCW25 (PRA) 24 ice blocks 6 batteries (for recharging the electronic components)	Dometic RCW4 16 ice blocks 6 batteries
PRA equipment (Installed by PATH)	2 freezers Ice blocks Toolbox	
PRA team (Moving warehouse)	1 maintenance staff 2 conveyors 2 drivers	
Monitoring system	LogTag Recorders, device memory, web platform, and monthly field visits	

Abbreviation: PRA, Regional Supply Pharmacy.

Test locations: Nioro district

	Fixed	Mobile
6 health posts	Saboya Niappa Bala Thila Grand	Keur Moussa Gainth Kaye Niassene Walo
Health post equipment (Installed by PATH)	Dometic RCW12 RCW8 24 ice blocks 6 batteries (for recharging the electronic components)	RCW4 16 ice blocks 6 batteries
Health center equipment (Installed by PATH)	1 Dometic freezer Stock of ice blocks 1 toolbox	
Team (Nioro health district)	Maintenance staff 1 focal point nurse	
Monitoring system	LogTag Recorder, device memory, web platform, and monthly field visits with the district staff	

Wastage results*

Study sites	Total population	EPI annual target	EPI monthly target	Vaccines (doses) stored in the device						Total vaccines (doses)	Wastage	Fixed strategies session
				BCG	PENTA	Measles	OPV	TT	YF			
Saint-Louis (6 HPs)	49,846	1,944	163	815	2,386	732	2,714	929	713	8,289	0	18
Nioro (6 HPs)	39,308	1,533	127	780	2,334	720	2,673	835	754	8,096	0	8
Total	89,154	3,477	290	1,595	4,720	1,452	5,387	1,764	1,467	16,385	0	26

Abbreviations: BCG, bacillus Calmette – Guerin; EPI, Expanded Programme on Immunization; HP, health post; OPV, oral polio vaccine; PENTA, pentavalent; TT, tetanus toxoid; YF, yellow fever.

*Matrix data collection from January to June 2014..

User experience

- **Adds comfort.** The device help nurses in their daily immunization activities (easy to clean, no defrosting work, …)
- **Easy to use.** Findings show the device is easy to use and help nurses in their routine work (temperature is easy to monitor, no maintenance, vaccines vials are easy to pack...).
- **Power cuts issue.** No more worry regarding saving vaccines during recurrent power cuts
- **Space for storage.** The unit does not occupy too much space in the H.P
- **Never out of order:** only the electronic system can fail

However,

- **The capacity** of the device is insufficient during immunization campaigns
- **No possibility** to keep other temperature sensitive products in the p6
- **weight of the device** heavy to carry for outreach

Conclusion

This long range new passive vaccine storage device carries a lot of hope to solve problems in areas where electricity is unstable or absent. It minimizes recurrent maintenance problems of the cold storage equipments and therefore provide good solutions to ensure the continuity of the cold chain everywhere.

THANK YOU !

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