



Private sector engagement for COVAX

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16th TechNet Conference

Shaping a resilient and adaptive immunization program



UPS Healthcare

Quality Focused. Patient Driven.

Covid19 Vaccine Discussion

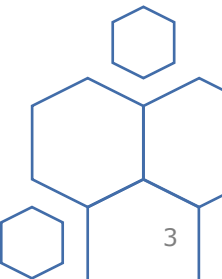
Making the Supply Chain Capable & Ready to Deliver

October, 2020



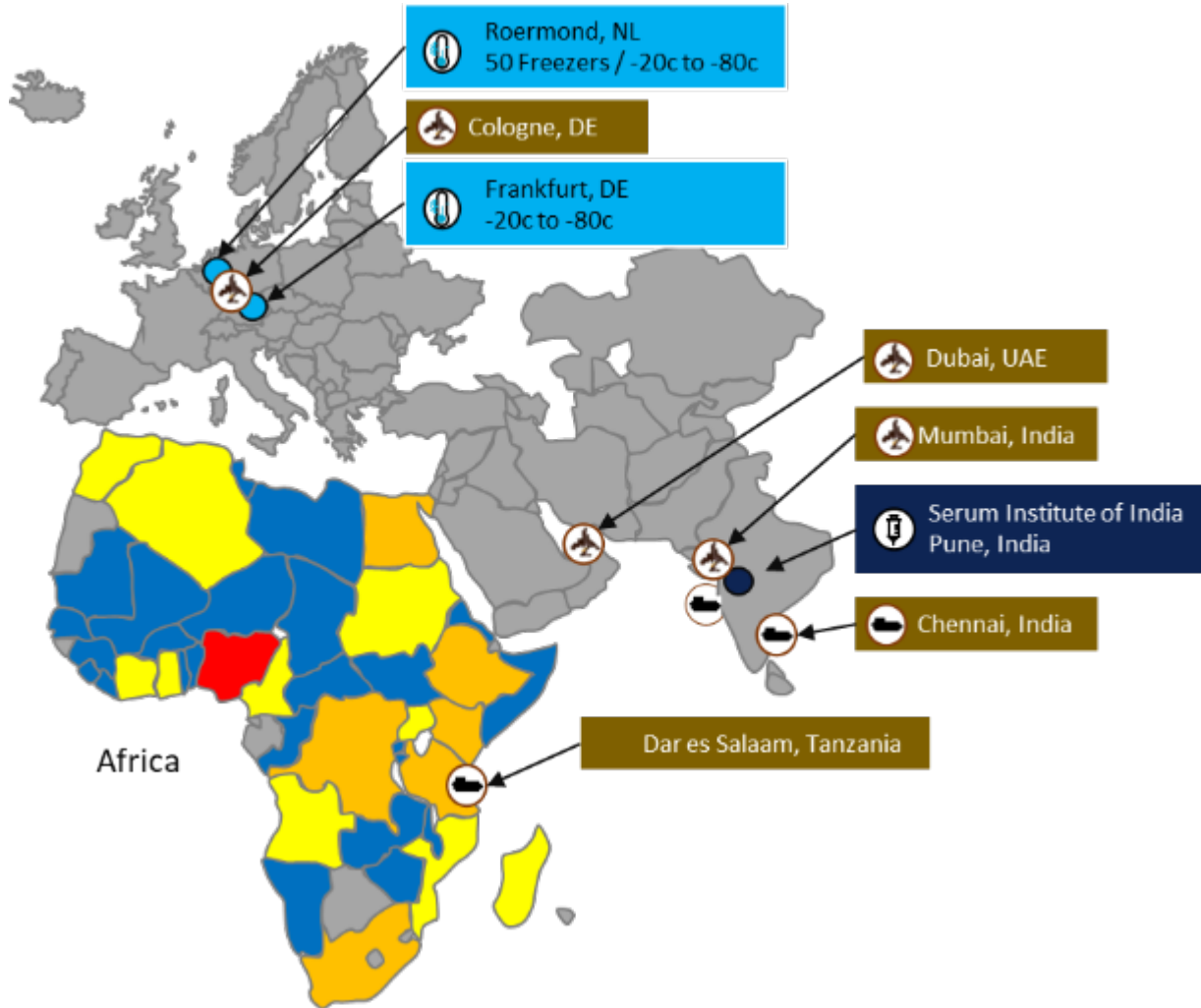
DISCUSSION AGENDA

- **Shipping Covid19 Vaccines Into LMICs in Africa & Beyond**
- Modeling Cold Storage Requirements in African Countries for -20C to -80C
- In Country Last Mile Delivery Solutions



TRANSPORT OF COVID19 VACCINES TO AFRICA

Transportation Modeling – How Will We Get This Much Frozen Product Into LMICs in African & Beyond?

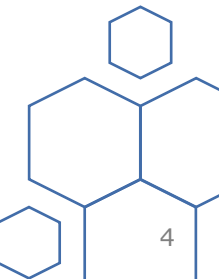


Dosage Deliveries; For 2ml, 1-dose vials @ -80C

	3% Population	20% Population
Red	+10M Doses	+80M Doses
Orange	3M to 10M Doses	20M to 80M Doses
Yellow	1.5M to 3M Doses	10M to 20M Doses
Blue	150K to 1.5M Doses	1M to 10M Doses
Grey	<150K Doses	<1M Doses

Kilogram Deliveries; For 2ml, 1-dose vials @ -80C

	3% Population	20% Population
Red	463,021 kgs	3,086,808 kgs
Orange	1,077,420 kgs	7,182,804 kgs
Yellow	777,532 kgs	5,183,149 kgs
Blue	649,546 kgs	4,330,306 kgs
Grey	43,669 kgs	291,128 kgs



TRANSPORT OF COVID19 VACCINES TO AFRICA

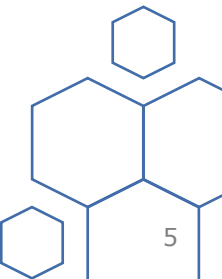
It Will Take an Extraordinary Number of Flights to Move This Much Frozen covid19 Vaccine Into Africa.

The number of flights is driven by multiple factors

- COVAX mechanism will allocate smaller vaccine allotments as vaccines become available
- Packaging of vaccines that are -20C or colder require the use of a coolant material, usually dry ice or PCM
- The amount of dry ice has strict limits per flight
- A lot of dry ice is required, can make up 70% of the total weight

Alternative Packaging Options

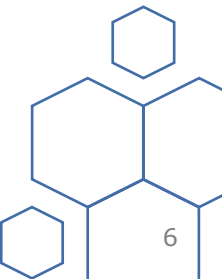
- Active containers can be used but have to be returned empty
- Phase change materials can be used but supply is limited



TRANSPORT OF COVID19 VACCINES TO AFRICA

The State Of The Global Air Freight Market Is One Limited Significantly By Capacity Constraints Due To Covid

- **Global capacity**, measured in available cargo tonne-kilometers (ACTKs), **shrank by 31.2% in July** (-32.9% for international operations) compared to the previous year. This is a small improvement from the 33.4% year-on-year drop in June.
- The ongoing capacity crunch continues to be driven by the lack of international passenger traffic. **The number of widebody planes** – the main aircraft type for bellyhold cargo – in service in the passenger fleet **was still down 42%** in year-on-year terms in July.
- In July, **international belly cargo capacity was down 70.5%** year-on-year, a modest progress from the nadir of the crisis in April (-82.5%).
- This was partially offset by a 28.8% increase in capacity through expanded use of freighter aircraft.

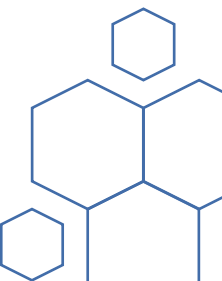
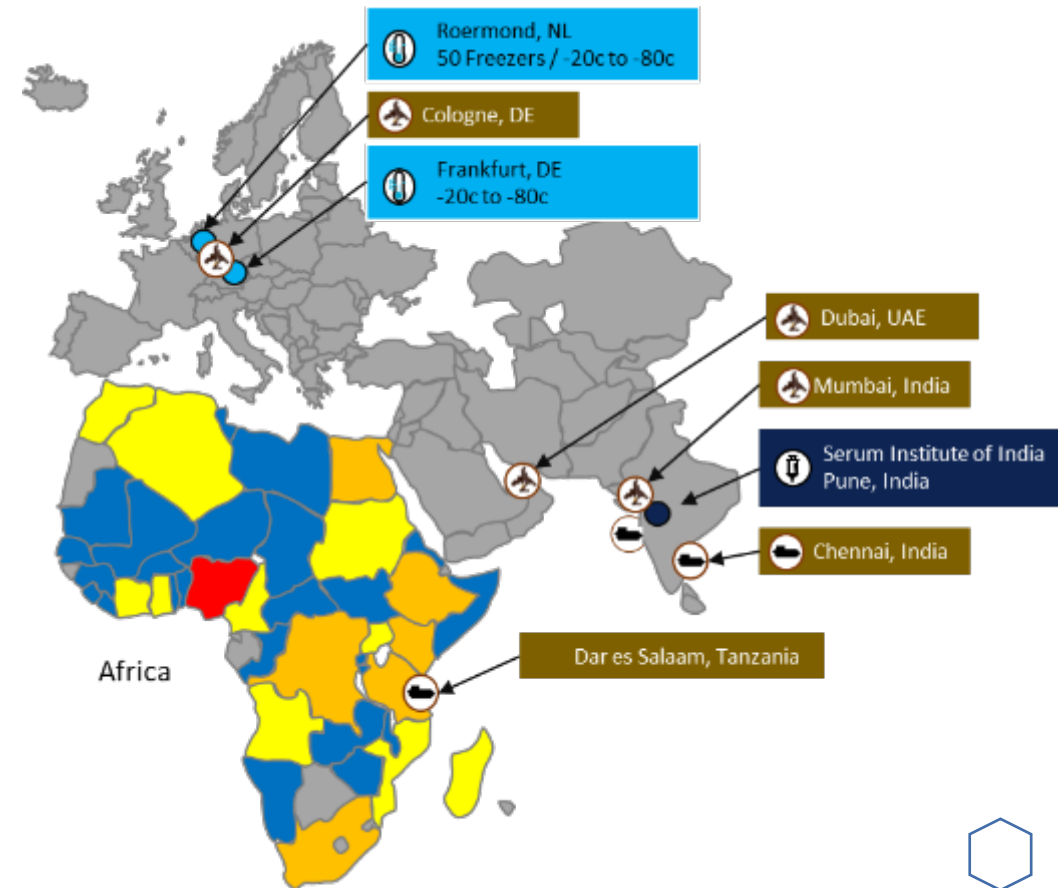


TRANSPORT OF COVID19 VACCINES TO LMIC'S

There Are Some Key Transport Strategies to Begin Working On Right Away

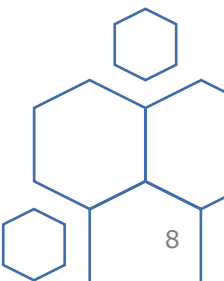
Key Strategies

- Start planning and working with air freight providers – both cargo freighter and passenger aircraft operators (airlines)
- Aggregate smaller country volumes onto common flights
- Align multiple packaging options due to capacity constraints
 - Limits on supply of dry ice
 - Active containers
 - Phase change materials.
- Work to develop alternative logistics routes and equipment
 - Ocean moves with inland cold chain trucking



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- **Modeling Cold Storage Requirements in African Countries for -20C to -80C**
- In Country Last Mile Delivery Solutions



FROZEN STORAGE IN AFRICAN COUNTRIES

The UPS team developed a model to quantify the need for freezer capacity in African countries to be able to store, handle, and distribute a UCC formulation of a covid19 vaccine across the in country supply chain

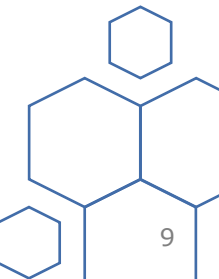
Each country will require two levels of freezer capacity

Level 1

- Larger shipments of UCC COVID-19 vaccines arriving via air freight from manufacturers
- Larger capacity freezers can be placed at a country MOH CMO location to store the inbound shipments while they are broken down and repacked for distribution.
- Analysis based on a freezer models that can maintain -20C and -80C holding 2ml 1-dose vials and 10ml 5-dose vials.

Level 2

- UCC COVID-19 vaccines moved and stored intra country awaiting administering to patients
- Smaller sized freezers are needed locally throughout the country to store the UCC vaccines closer to the points of administration
- Analysis based on a freezer models that can maintain -20C & -80C holding 2ml 1-dose vials and 10ml 5-dose vials.



FROZEN STORAGE IN AFRICAN COUNTRIES

Freezer Placement – **Larger Freezers** to Handle Inbound Shipments Into Countries Would Be Primarily Located At The MOH CMS In The Capital Area, Though Some May Be Forward Placed In Larger Urban Areas

Large Freezer Distribution



* +1 Redundant Unit Per Country

Model Assumptions

- 2 Doses per patient,
- Presentations; 2ml 1-dose vials and 10ml 5-dose vials
- Volumetrics based on known vaccine candidates
- 90 Day Dosing Period
- 10 Days per freezer turn

3% Population Coverage

- 80.4M Doses
- Large Freezer Units = 163 (100 for 10ml, 5-dose vials)
- 3 cbf Freezer Units = 385 (278 for 10ml, 5-dose vials)
- PLUS 1 Redundant Units

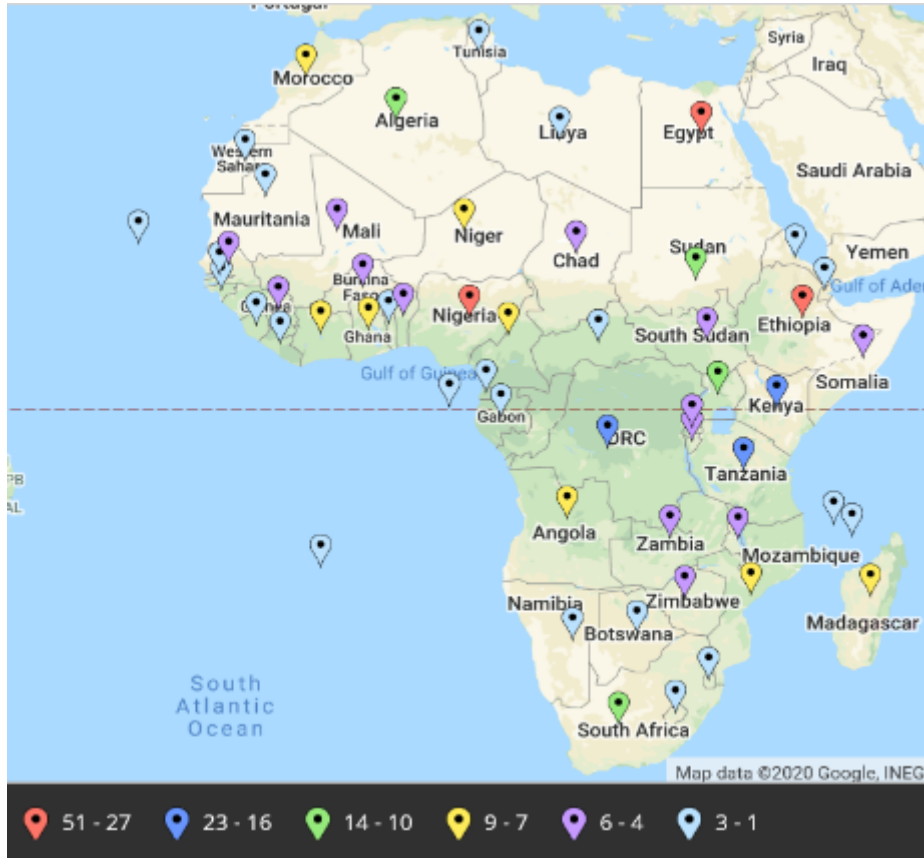
20% Population Coverage

- 536M Doses
- Large Freezer Units = 879 (478 for 10ml, 5-dose vials)
- 3 cbf Freezer Units = 2000+ (1,671 for 10ml, 5-dose vials)
- PLUS 1 Redundant Units

FROZEN STORAGE IN AFRICAN COUNTRIES

Freezer Placement – **Smaller Freezers** are to Maintain Cold Chain At Regional Hospitals & Local Clinics Are Distributed Throughout The Country Consistent With The Country's Vaccination Plans

3 CBF Freezer Distribution

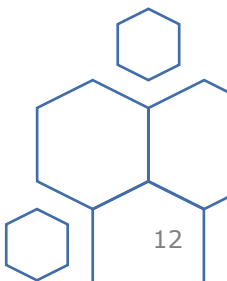


* +1 Redundant Unit Per Country

- Freezers would be dispersed across the country based on population density and geographical aggregation.
- Freezer storage would be dynamic with vaccines flowing in, being distributed, and then being refilled again in a cyclic manner on regular intervals.
- Flows of vaccines into and out of freezer storage locations will need to be coordinated tightly with patient administration (outbound) as well as with replenishment shipments from the CMS (inbound).
- It is like a symphony with all parts playing in rhythm to make vaccines flow smoothly and successfully

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- **In Country Last Mile Delivery Solutions**



IN COUNTRY LAST MILE DELIVERY SOLUTIONS

Delivering covid19 Vaccines To Points of Care Will Require Multiple Logistics Solutions

Key areas that will be critical for the last mile delivery of covid19 vaccines

- Refrigerated truck based delivery network
- Investments in cold chain vehicles
- Investments in tracking/visibility tools
- Cold chain packaging for intra-country transportation
- UAV (drone) delivery to remote locations



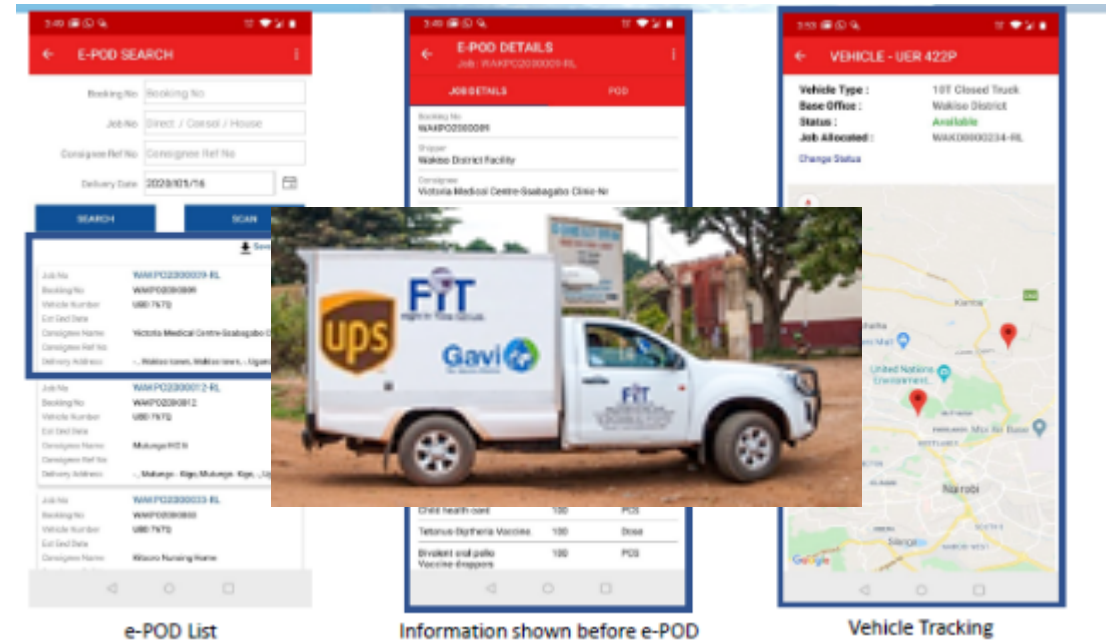
IN COUNTRY LAST MILE DELIVERY SOLUTIONS

Cold Chain Truck Delivery Networks Are Critical Solutions To Be Ready to Deliver covid19 Vaccines

Based on proof of concept solutions implemented by GAVI and UPS, we could quickly scale and get ready

UPS is investing in new capabilities and solutions like the in-country cold chain delivery networks for the regular resupply of vaccines and other commodities to clinics in Uganda.

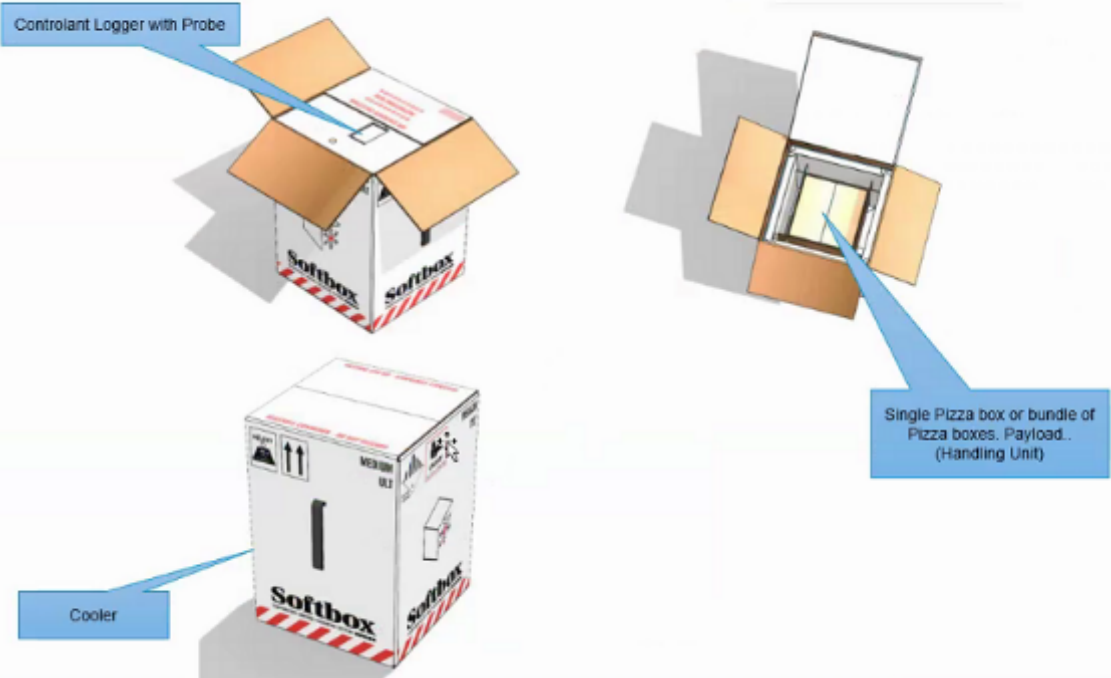
- Cold chain vehicles
- Storage
- Packaging
- Cell phone based application that links together:
 - Order placement
 - Shipment status
 - In transit visibility
 - ePOD in one shared location



IN COUNTRY LAST MILE DELIVERY Solutions

Packaging Solutions That Can Maintain Frozen Temperature for Days & Will Be a Critical Tool

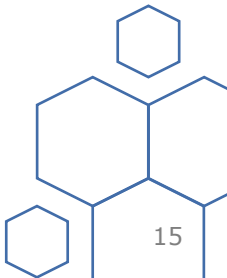
Packing: Softbox with Controlant logger



Softbox

- External Dimensions: 400 mm x 400 mm x 560 mm
- **Amount of Dry ice: 23 kg minimum**
- Empty Shipper: ~8.5 kg
- Estimated Vial Tray weight with 195 vials: ~1 kg (estimated)
- Total Shipper Weight with 1 pack: ~32.5 kg (assuming 1 kg vial tray weight x 1)
- Total Shipper Weight with 5 pack: ~36.5 kg (assuming 1 kg vial tray weight x 5)

Shipper Parameters			
1	Doses per Vial	15.7	Shipper Length IN
195	Vials per Vial Tray	15.7	Shipper Width IN
5	Vial Trays per Shipper	22.1	Shipper Height IN
8.5	Kgs Shipper Weight		
23.0	Kgs Dry Ice per Shipper		
5.0	Kgs Vaccine		



IN COUNTRY LAST MILE DELIVERY SOLUTIONS

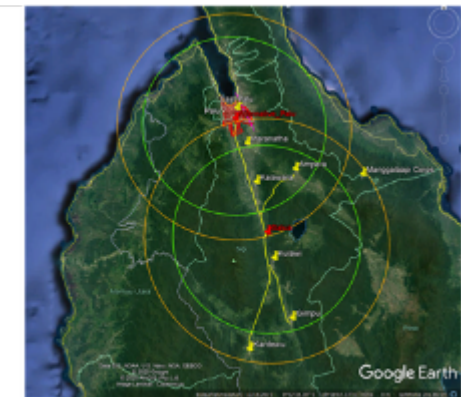
Drone Delivery of Vaccines to Remote Locations & Rural Populations is The right Tool at The Right Time

Drones can disrupt how humanitarian health aid is being provided

- Reach Isolated communities to increase testing and vaccination
Contactless deliveries - minimizing human contact and virus transmission
- Faster deliveries - from hours by car/van to minutes by drone
- Overcome logistical in-country constraints due to lockdowns
- Have same level of testing confidence in rural areas as in cities



Drone range mapped to clinics



Drone range

IN COUNTRY LAST MILE DELIVERY SOLUTIONS

Drone Delivery of Vaccines to Remote Locations & Rural Populations is The right Tool at The Right Time



Drone delivery. How it works?

Healthcare worker places on-demand medical supply order via phone or text.

Order is received and filled from Regional Stocks

The drone is packed, prepped, and can be launched in minutes.

Healthcare workers receive and administer essential vaccines to patients.



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