

MEGHALAYA DRONE DELIVERY NETWORK (MDDN)

Introduction:

On 26th August 2021, the Prime Minister of India, through the Ministry of Civil Aviation, announced the liberalized Drone Rules, 2021 ushering in a new way to look at transportation.

The Government of Meghalaya decided to capitalize on this historic initiative for the public health logistics sector since the State is characterized by a challenging road network infrastructure and hard terrain, amongst multiple other issues.

Accordingly, a pilot test on the usage of drones was successfully conducted on 26th November 2021. The flights from a Civil Hospital to two Primary Health Centres (PHCs) in West Khasi Hills District, which were considered very difficult to reach were successfully completed.

Having established a proof of concept, the Government of Meghalaya has constructed a Drone Station, believed to be the first of its kind for these purposes in the continent, at Jengjal Sub-divisional Hospital in West Garo Hills, to serve as a new and efficient means of transport for all the rural health facilities falling within a radius of 50 km.

In this regard, the Government of Meghalaya launched Asia's first Drone Station at Jengjal Sub-divisional Hospital, West Garo Hills District, on 5th December 2022 via the Meghalaya Health Systems Strengthening Project (MHSSP).

The Drone Station is running routine and emergency deliveries of medical commodities such as vaccines, medicines, diagnostic samples and other supplies to and from remote health facilities.

Rationale:

Meghalaya's public health supply chain faces numerous logistical challenges, especially affecting the delivery of healthcare items to hard-to-reach health facilities. As per the Basic Road Statistics Report (2017-18), surfaced roads to total roads percentage of 36.02% in Meghalaya is the second lowest in the country.

Apart from the challenging road network infrastructure and hard terrain, natural shocks and disasters, emergencies and security threats, etc. contribute to an already overburdened public health system, resulting in increased vulnerability of children and mothers. Compounding the challenges mentioned above,

approximately 79% of the population of Meghalaya resides in rural areas (Census 2011).

1. The turnaround time for delivery of medicines to hard-to-reach facilities was high leading to low availability of medical supplies. This has resulted in cases where patients have died while transferring from the primary health centre to a referral centre. Also, there were cases where the patient had to travel unnecessarily to secondary and tertiary care facilities due to the unavailability of certain medicines or diagnostic equipment.
2. TB is a major concern for the State, where the death rate due to TB is quite high. In line with the “National Strategic Plan for Tuberculosis Elimination 2017–2025” and Meghalaya’s “State Health Policy”, the Government of Meghalaya wanted to see a rapid decline in the number of TB deaths, while working towards eliminating TB by 2025. Early case detection is vital to interrupt the transmission of TB disease.
3. Meghalaya aims to address the growing burden of NCDs through planned early detection. Citizens residing in rural areas will need to travel far distances to receive the proper health care required for NCD regarding diagnostic skills and equipment. The expenses incurred for travel and healthcare services become very expensive for such citizens. Hence, the importance of early detection and diagnosis at the primary healthcare level and subsequent early treatment capabilities within the overall system will greatly contribute to mitigating the socio-economic stress and adverse health effects for the people residing in rural areas.
4. At the end of the second wave, the possibility of faster-to-spread and deadlier new COVID variants materialising was high. The State wanted to maximise preparedness Hence if the third wave arrives, the State is committed to minimising the ill effects of the COVID-19 virus on the citizens. There was a need to manage the logistics of COVID-19-related healthcare items like vaccines, samples for testing, etc. to and from the identified locations at a faster rate.

Description of Model:

1. **Physical** - Hub and Spoke Model. Hub-Permanent Drone Station at Jengjal SDH and Spokes-Health facilities in difficult-to-reach areas.
2. **Financial** - Per kg per km basis

3. **Technological/IT** - Drones with Beyond Visual Line of Sight (BVLOS) capability
4. **Social** - Drones as a new mode of transportation where medicines will always be available at health facilities

Human Resources:

Existing health personnel at the activated facilities are trained to load and unload the packages delivered by the drones. Pilots from our drone partner, Tech Eagle Innovations Pvt Ltd are operating and maintaining the drones.

Capacity Building Strategies:

Existing health personnel at the activated facilities are trained to load and unload the packages delivered by the drones. Consequently, identified existing personnel will be trained to change battery packs for the drones to enable the drones to reach the farthest corners of the State, that are not covered under the 50 km radius. On a medium-term horizon, our drone partner will identify, hire and train local candidates for piloting the drones.

Evidence of effectiveness:

1. Extensive demonstration of the capability of the drone in terms of consistency, precision and delivery.
2. Reduction in delivery time by 1/5th of the actual time needed. (3-4 hours by road reduced to 30 minutes one way)
3. Demonstration of reverse logistics where blood samples have been tested and reports shared within an hour of blood collection.

Cost:

INR 75 per kg per km. The average payload is around 2 kg.

Summary of lessons and challenges:

While developing the Innovation: Multiple Countries, Indian States, Companies, Startups, etc have used drones as a logistical solution but only as a demonstration or proof of concept. Hence, there was very little information or resources available that would help us in planning a large-scale hub and spoke model for the implementation of a drone delivery system.

While implementing the Innovation:

1. Due to the hilly terrain, there was a space constraint within the compound of the health facilities, especially on a flat surface. Hence, the identification of a suitable and safe space as the landing site was a challenge.
2. There was a high unpredictability of the weather conditions which made it challenging to execute planned flights semi-autonomously.

Scalability:

The future aspiration of the Government of Meghalaya is to scale up the Project for the entire State by setting up similar Drone Stations at strategic locations such that all remote health facilities are covered. The drone stations will integrate with the existing public health supply chain and enable better health outcomes for all citizens.

Two more locations in West Khasi Hills District and West Jaintia Hills District for the hub have been identified that would essentially cover the entire State.

Implementation partners:

TechEagle Innovations Pvt Ltd

Logistics data up to November 2023:

MDDN Total Logistics Data				
Date	Number of flights taken	Ariel distances covered (km)	Payload transported (grams)	Total airtime of aircraft (hh:mm:ss)
Dec 2022	26	977.68	24,305.00	12:54:55
Jan 2023	34	1,285	29,456.00	17:05:25
Feb 2023	42	1,402.14	42,445.00	18:51:01
Mar 2023	52	2069.2	53,433.00	25:36:44
Jun 2023	2	31	1,946.00	0:29:18
Jul 2023	0	0	0.00	0:00:00
Aug 2023	1	18	1,553.00	0:18:00
Sept 2023	2	177	0.00	11:00:00
Oct 2023	7	289	5,258.00	16:56:06
Nov 2023	1	40.3	1,620.00	0:29:50
TOTAL	167	6289.32	160,016.00	103:41:19