

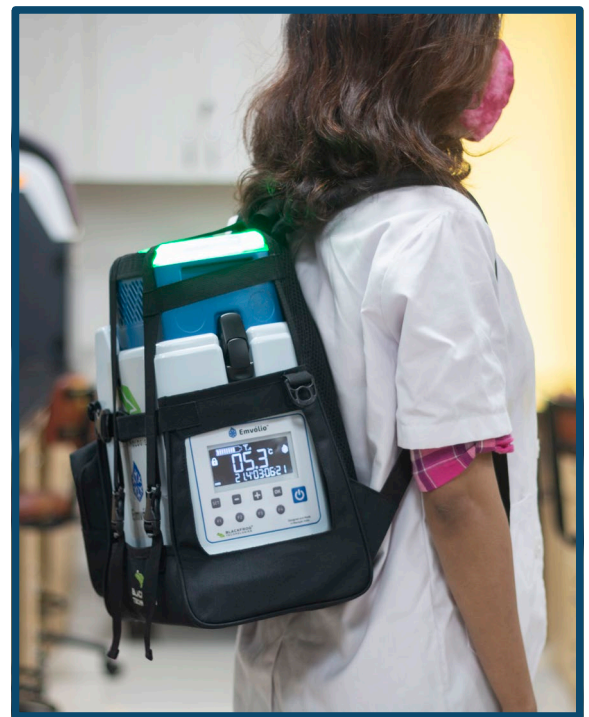
Blackfrog Technologies Pvt. Ltd. is a Manipal, KA based technology startup company that seeks to improve the efficiency of immunization supply chains. We have developed patented technologies for precision cold-chain and vaccine traceability systems with support from BIRAC (DBT) and leading impact investors in the nation including Venture Centre (NCL, Pune) and Social Alpha to provide logistical support in the last-mile delivery of vaccines.

Amid surging cases and an acute shortage in the supply of COVID-19 vaccines, the emerging economies certainly cannot afford vaccine wastage. However, since our immunization drive relies heavily on bringing vaccines to the people, rather than vice-versa, there is scope for vaccine wastage in transit during the 'last mile' (from healthcare centre to location of administration), due to exposure to non-optimal temperatures. Despite varying storage temperature and requirements, every drug currently being administered as part of the immunization drive across nations, including Pfizer, Moderna, Covaxin (BBL) and Covishield (AZ) require temperature between 2 and 8 degrees Celsius (35-40 deg F) during the last-mile of transport. More importantly, most vaccine candidates (BBL, AZ etc) are even freeze-sensitive. Therefore, in order to ensure their efficacy, exposure to temperatures outside the optimal range must be minimized.

Unfortunately, iceboxes, the predominant mode of last-mile vaccine transportation for COVID-19 vaccines, are not equipped for this task. Since they have no mechanism for temperature control and regulation, there exists the risk of accidental freezing and/or thawing, rendering the temperature-sensitive vaccines inefficacious. This is especially likely when vaccines are to be transported to distant and remote locations with harsh weather conditions. As a result, even when vaccines reach their destination in time, there exists the prospect that they have been compromised. Additionally, the lack of reliable temperature monitoring capabilities in iceboxes makes it challenging to determine the efficacy of the vaccines in advance. It is possible, then, that a proportion of the population receives inefficacious vaccines, significantly impeding immunization efforts.

## Emvólio: Product Overview

Emvólio is a portable, battery-powered refrigeration device that will strictly maintain any preset temperature for over 12 hours for last mile transport of vaccines\*. Emvólio's 1.8-litre capacity enables it to carry 30-50 vials, which is standard for a day-long immunization campaign. Further device capabilities include continuous temperature monitoring, location tracking, state-of-charge indication, communication with headquarters via live tracking, and vital statistics for improved coverage. This system has been helping remote hospitals relieve the economic burden of wasted vaccines. Further, it helps optimize human resources in vaccine delivery by removing the need for repeated immunization visits to account for the administration of unviable vaccines. Most importantly, our battery-powered device stands apart from the competition with its unmatched portability and ease of charging. Blackfrog is an ISO 13485 certified manufacturer of medical-devices and Emvólio has been designed in accordance with WHO-PQS E003 standards.



Ergonomic & Fits into a Backpack

\*The product is designed in accordance with the draft-specifications of WHO-PQS for a portable fridge. The independence is 12 hours i.e. the device will maintain a strict 2-8 deg C at an ambient temperature of +43 deg C. The device is capable of operating for longer hours (up to 20 hours) in lower ambient temperatures.

