



Zipline runs the only national-scale instant logistics network in the world, powered by the world's largest automated, on-demand delivery service.

Pfizer applies science and global resources to bring therapies – including innovative medicines and vaccines – to people that extend and significantly improve their lives.

### KEY HIGHLIGHTS

- ▶ Efficient, equitable and timely distribution and administration of any vaccine requires advance planning against the manufacturer's storage and distribution guidelines.
- ▶ Close coordination across all stakeholders is critical for ensuring the success of any vaccination campaign.
- ▶ Equitable access can be achieved, even in countries with limited ultra-low temperature storage.

## EXECUTIVE SUMMARY & KEY LEARNINGS: PFIZER AND ZIPLINE'S END-TO-END COVID-19 VACCINE DISTRIBUTION TEST

### BACKGROUND: ALIGNING ON THE OBJECTIVE OF EQUITABLE ACCESS

Pfizer and Zipline share a common strategic goal: **enabling equitable access to COVID-19 vaccines to every human across the globe.** The Pfizer-BioNTech COVID-19 vaccine, like all COVID-19 vaccine candidates on the market, requires storage and transportation in controlled temperature conditions. Distributing these types of products rapidly and at national scale has no precedent in modern public health.

To demonstrate the process of moving temperature-sensitive vaccines efficiently, quickly, and with high quality control, **Pfizer and Zipline collaborated to test the end-to-end supply chain from a vaccine manufacturing facility in Europe, to a last-mile health post in rural Ghana.**

Key learnings from the test are summarized in this checklist to support governments as they plan and manage their own mass distribution of COVID-19 vaccines in the months and years ahead.

### TESTING APPROACH: FROM PFIZER IN BELGIUM TO ZIPLINE IN GHANA



Vaccine placebos transported in thermal shippers at  $-90^{\circ}\text{C}$  to  $-60^{\circ}\text{C}$  were air shipped from Belgium to Ghana.



Placebos were transported from Accra in ambient vans to two of Zipline's most remote distribution centers.



Upon arrival, the placebos were logged as inventory, transferred to ultra-low temperature freezers, and taken through the conditioning process for storage in  $2^{\circ}\text{C}$  to  $8^{\circ}\text{C}$  refrigerators.



Zipline deconsolidated trays of placebos and delivered them by autonomous aircraft in thermal packaging to some of the country's hardest-to-reach health clinics.

# COVID-19 VACCINE DISTRIBUTION TEST: KEY LEARNINGS FROM THE PFIZER + ZIPLINE END-TO-END TEST

## 2-3 MONTHS AHEAD OF DISTRIBUTION

*Efficient, equitable, and timely vaccine rollout requires advance planning around storage and distribution. Zipline and Pfizer's end-to-end testing revealed several key areas where the process can be accelerated to ensure the best possible outcome.*

**Qualify ultra-low temperature freezers:** Begin the process of qualifying ultra-low temperature freezers as soon as possible. In some countries, specialists can be hired for this purpose, but qualification can also be conducted in-house by following the processes provided by the freezer manufacturer. In certain cases, this may require specialized equipment.

**Acquire temperature monitoring devices:** Temperature monitoring devices can be essential to the vaccine distribution process, depending on local Board of Health requirements. Monitors are also required for the freezer qualification process, and should be ordered four to six weeks in advance.

**Plan for materials requirements:** Most countries are equipped to move enough vaccines for 1-3% of their populations on an annual basis, but the realities of the COVID-19 pandemic necessitate moving vaccines in larger volumes and at a more rapid pace, which means more of everything is required. To give suppliers ample time to ramp up production, countries should take an inventory of every item required to move a vaccine to the last mile and begin placing orders with manufacturers a few months ahead of when they will be needed.



For more information on Zipline's services, contact [GlobalHealth@flyzipline.com](mailto:GlobalHealth@flyzipline.com)

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# COVID-19 VACCINE DISTRIBUTION TEST: KEY LEARNINGS FROM THE PFIZER + ZIPLINE END-TO-END TEST

## 2-4 WEEKS AHEAD OF DISTRIBUTION

*Avoid delays and inefficiencies in the importation, distribution, and storage of vaccines by ensuring close coordination across all stakeholders.*

**Importation:** Distributors should work closely with partners responsible for customs clearance, as well as customs officials themselves, to ensure documentation is complete and accurate before any COVID-19 vaccine is shipped. This will avoid importation delays, which can put timelines in conflict with manufacturers' storage guidelines. Importers and ground distributors should ensure they have a clear plan to re-ice thermal shippers in the event of delays as vaccines are transported to their final destinations.

**Accounting for all health facilities' needs:** National and regional EPI coordinators should include health facilities in their advance planning to ensure their storage and distribution needs are reflected in final plans, limiting potential disruptions to equitable access.

## READY FOR DISTRIBUTION

*With appropriate and aligned strategies and capabilities, equitable and rapid access to vaccines can be achieved, even in countries with limited ultra-low temperature storage.*

**Centralized storage and deconsolidation:** Centralizing storage, deconsolidating vaccine trays, and distributing smaller quantities to dosing sites for same-day use is an optimal strategy for countries with limited ultra-low temperature freezer storage. Once thawed, Pfizer's vaccine can be stored at 2°C to 8°C for up to 1 month, enabling routine transport and storage across regions surrounding a single ultra-low temperature storage point.

**Last mile distribution:** Combining a centralized storage system with a pull distribution strategy can minimize vaccine wastage and dramatically increase access. On-demand delivery, such as Zipline's autonomous system, enables countries to match demand with supply, ensuring that every dose is utilized.

## CONCLUSION

Ghana scored #1 out of all AMC countries on Gavi's Vaccine Introduction Readiness Assessment, and was the first country in the world to receive COVID-19 vaccines from the COVAX Facility. Even with a strong supply chain in place, this end-to-end test highlighted numerous opportunities for efficiency and speed that other countries can benefit from adopting.

Conducting a readiness exercise helps stakeholders get organized, trained, and prepared; proactively instigates coordination and alignment; and ensures upstream supply chains are ready to meet the need when the vaccines arrive. All countries should conduct an end-to-end dry run before rolling out COVID-19 vaccines countrywide to maximize readiness and success.