

Revolutionizing Rwanda's Supply Chain The Impact of UAVs (2016-2023)

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Last Mile Delivery of Blood Products (1)



Before 2016, Key challenges that hindered last mile delivery of Blood products and other emergency medicines in Rwanda included:

- Limited connectivity of the road network to all HF (Especially during rainy seasons)
- Insufficient vehicles to transport emergency products on time
- Expiry of Blood products and other emergency medicines in the Health facilities (About 30% wastage)
- Being un able to satisfy demand of products due to lack of information (No data available of what is really needed)

Last Mile Delivery of Blood Products (2)

2016 to date:

Government of Rwanda (GoR) - Zipline partnership

- Establishment of two UAVs distribution centers,
- Zipline began in Rwanda with the delivery of the most essential, life-saving commodity: blood.
- Today, the UAVs deliver to 624 delivery sites across 27 districts (health facilities, hospitals, farms, etc.)
- Zipline deliver over 12,000 packages in a single month (Average of 97% on-time delivery rate)

Current key deliveries include:

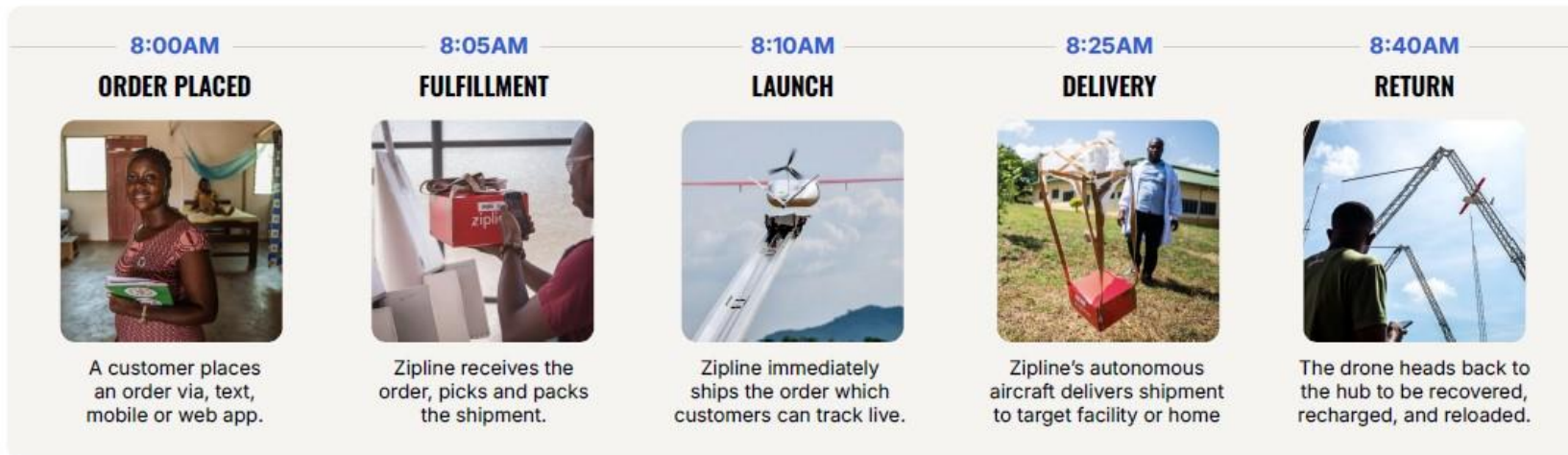
- Essential medicines,
- Vaccines,
- Childhood nutrition,
- Animal health,
- NCDs medications, and
- Tourism gifts.

Last Mile Delivery of Blood Products (3)

Milestones:

- Improving the turn around time by 80-90%
- Reduction of wastage by 90%
- Hospital satisfaction 99.5% from 47% in 2014
- End-to-end data accessibility
- Reduction of Maternal mortality due to shortage of blood by 99%

What a typical order looks like



This testimony was published by the new Times (A news paper) on Monday, June 26, 2023

Five years ago: 43-year-old Martha Uwitonze found herself in a restless state, unable to sleep, owing to a distressing combination of symptoms—a soaring fever and a complexion drained of colour. Recognising the gravity of the situation, her 13-year-old son alerted their neighbours who promptly arranged for her urgent transport to Rwinkwavu Hospital, situated in Kayonza District in Eastern Province.

Recalling the ordeal, Uwitonze shared: “Before I could fully digest the situation, I found myself receiving six units of blood through transfusion, ultimately leading to an overnight hospital stay.”

- Rwinkwavu Hospital is 2h30 round trip from the closest Regional Center for Blood Transfusion.
- Zipline UAVs delivered blood in less than 30 minutes and Martha was transfused.



In the same New Times article, Dr Balkachew Nigatu, an obstetrician-gynaecologist at Rwinkwavu Hospital with over 14 years of experience, speculated her experience in managing Bleeding in mothers.

He explained that, severe bleeding after childbirth is responsible for approximately 75% of all maternal deaths caused by major complications.

Dr Nigatu said, “Approximately one in every 50 deliveries I attend involves severe bleeding that necessitates blood transfusion.” He cited a recent case of a woman with placenta adherence who required repeated surgeries due to the attachment of the placenta to her uterus. “Separating the placenta was challenging, resulting in excessive bleeding, and she needed 14 units of blood (one unit contains 450ml of blood) to recover,” Dr Nigatu recalled.



One can only conclude that it is easy to manage a case like the one above when you have access to timely deliveries of blood products.

In 2022, Zipline, in partnership with the Rwandan Agricultural Board,

- Delivery of sensitive animal health inputs (swine and livestock vaccines)

NOTE: Since program inception, Zipline has delivered more than 35,000 units of swine semen, and over 100,000 doses of animal vaccine.

Outcome: Increased access to artificial insemination services and reduction in animal diseases.



Efficiency

Impact of using UAVs – Child nutrition



Improving Childhood Nutrition: Since 2022, Zipline has partnered with the Rwanda National Childhood Development Agency (NCCA) to distribute four different kinds of child nutrition products, including ready-to-use therapeutic foods (RUTF).

- Prior to that: Health centers in Rwanda experienced high stock out rates for these products, directly impacting child nutrition rates in the country.
- Since the start of this partnership, Zipline has distributed more than **600,000 units of specialized nutrition products** to hundreds of delivery points, supporting health equity and contributing to reduced stunting and malnutrition in Rwanda.

Independent research have validated the impact of scaled drone operations on population health.

Note: In Rwanda UAVs make a delivery every 70 seconds (Transporting blood, vaccines, Animal health products and nutrition supplements) to health facilities and community drop points across the country

- According to a study conducted by **researchers at the University of British Columbia** and published in **The Lancet**, the use of UAVs (Zipline) reduced **blood expiries by 67% between 2016-2019**. By centralizing almost all of the country's blood supply and sending it on-demand where it's needed, they also increased the order fill rate from 70% to above 99%.
- A study conducted by **The Wharton School at UPenn** found that the use of UAVs (Zipline) **reduced in-hospital maternal mortality due to PPH by 51%**. Additionally, it found that transfusing facilities decreased on-hand inventory by 62% and reduced the number of units destroyed or damaged by 42%.
- An article published in **Science Robotics** explained how autonomous drone delivery of medical supplies has improved access to health care for local communities in Africa especially in Rwanda.



Warehousing and inventory management

- GoR - Zipline partnership: Building and operating strategically located networks of pharmaceutical and medical-grade warehouses, equipped with state of the art cold chain storage.
- Each central warehouse serves an unlimited number of delivery points within a **38,000 km² area**. This centralized hub-and-spoke model enables supply chain optimization – reducing stock outs, overstocking, expiries, and wastage.



Data and performance management

- Improved visibilities on all items delivered by Zipline.
- There is a complete, accurate, real-time data, insights, and reports.
- Easy to improve planning and forecasting and to ensures **100% transparent end-to-end track-and-trace** of commodities.



Distribution and logistics management

- Zipline delivers shipments UAVs which extend last mile access to hard-to-reach populations.
- Each aircraft can hold up to **3 kg** (which equates to four units of blood or over 100 vaccine vials)
- Fly a roundtrip distance of up to **250 km**.
- Deliveries reach healthcare facilities or community distribution points and their patients within **15-45 minutes**.