

Cost-effectiveness of Drone versus Road Transport for Blood Delivery in Rural Rwandan Obstetric Emergencies: A Short Report

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Published: 12 December 2023 | **Received:** 03 September 2023 | **Accepted:** 29 October 2023

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DOI: [10.5281/zenodo.18531672](https://doi.org/10.5281/zenodo.18531672)

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Abstract

Postpartum haemorrhage is a leading cause of maternal mortality in rural Rwanda. Timely access to blood products is frequently delayed by difficult terrain and inadequate road infrastructure, contributing to preventable deaths. This short report conducted a comparative cost-effectiveness analysis of unmanned aerial vehicles (drones) versus conventional road transport for emergency blood delivery to rural health centres in Rwanda's Eastern Region. A decision-analytic model was developed using operational data from a drone delivery service and comparator road transport data. The analysis incorporated direct costs of transport, storage, and personnel, alongside health outcome data related to blood delivery times for obstetric haemorrhage. The primary outcome was the incremental cost-effectiveness ratio (ICER) per life-year saved. Drone delivery was more cost-effective than road transport for distances over 25 kilometres. The model estimated that drone delivery reduced the mean time to blood receipt by 58%. The ICER for drone delivery fell below a commonly referenced cost-effectiveness threshold for Rwanda. Drone-based delivery of blood products for obstetric emergencies in rural Rwanda is a cost-effective strategy compared to road transport, particularly for longer distances. It can reduce transport-related delays in emergency care. Policy makers should consider integrating drone delivery networks into national blood supply chains for remote areas. Further operational research is needed to optimise integration with existing emergency response systems and assess scalability. drones, unmanned aerial vehicles, cost-effectiveness, maternal health, postpartum haemorrhage, blood delivery, Rwanda, emergency obstetric care This analysis provides evidence for health policy and planning, demonstrating the economic and operational viability of drone technology in strengthening emergency blood supply systems.

Keywords: *Postpartum haemorrhage, Cost-effectiveness analysis, Drone delivery, Rural healthcare, Sub-Saharan Africa, Blood transfusion, Maternal mortality*

ABSTRACT-ONLY PUBLICATION

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