



Replication Study: Cost-effectiveness of Drone-delivered Blood Products for Postpartum Haemorrhage in Remote Karamoja, Uganda

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Abstract

Postpartum haemorrhage (PPH) remains a leading cause of maternal mortality, especially in remote areas with limited transport. A prior modelling study found drone delivery of blood products for PPH to be cost-effective in Karamoja, Uganda. Replicating this analysis is important to verify the original findings, particularly as operational costs for drone technology may change. This study replicated the original cost-effectiveness analysis of drone-delivered blood for PPH in remote Ugandan health centres. The primary objective was to verify the model's outcomes. A secondary objective was to test the sensitivity of results to updated, locally relevant cost parameters for drones and logistics. This replication used a decision-analytic model. The original model structure and Ugandan epidemiological data were reproduced exactly. The primary analysis recalculated the incremental cost-effectiveness ratio (ICER). A secondary analysis replaced original cost inputs with updated figures from recent operational drone delivery programmes in similar East African contexts. The replication confirmed the original result that drone delivery was cost-effective compared to road transport, with an ICER below Uganda's threshold. However, the secondary analysis using updated costs showed a less favourable, though still cost-effective, ratio. A modelled increase in drone maintenance costs reduced the cost advantage by approximately one quarter. The replication validates the core finding that drone delivery of blood for PPH in Karamoja is cost-effective. This supports the evidence for policy consideration. The conclusion is sensitive to operational cost assumptions, which must be context-specific. Programme planners should undertake detailed, local costing exercises before implementation. Future research should incorporate real-world operational data as programmes scale. postpartum haemorrhage, drones, cost-effectiveness analysis, blood delivery, Uganda, replication study, maternal health This independent replication study verifies and strengthens the evidence on the cost-effectiveness of drone-delivered

blood for postpartum haemorrhage in remote Uganda, while highlighting the sensitivity of results to operational costs.

Keywords: *Postpartum haemorrhage, Cost-effectiveness analysis, Maternal mortality, Sub-Saharan Africa, Health systems research, Remote healthcare, Emergency obstetric care*

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