

## ABSTRACT

*Blood inventory management plays a crucial role in ensuring the availability of blood for medical needs. This study analyzes the inventory challenges of Packed Red Cells (PRC) type AB at Palang Merah Indonesia (PMI) Banyumas, which faces supply and demand imbalances, leading to shortages. To address this issue, a Monte Carlo simulation with 43 replications was conducted using Microsoft Excel to optimize inventory control, minimizing costs while maintaining a high service level. The initial model recorded a shortage of 62 blood bags, a total inventory cost of Rp 30,816,533, and a service level of 86.58%. In the first scenario, an additional 55 blood bags were sourced from other PMI units, reducing the shortage to 11 bags, lowering inventory costs to Rp 10,968,042, and increasing the service level to 96.49%. The second scenario involved a 15% increase in donor participation, further reducing the shortage to 5 bags, with a total inventory cost of Rp 9,927,682 and a service level of 98.66%. These results suggest that the second scenario is the most effective solution for reducing shortages without increasing blood expiration, providing a valuable recommendation for PMI Banyumas to enhance its blood inventory management efficiency.*

*Keywords: Blood Inventory Management, blood supply, Packed Red Cellss (PRC), Monte Carlo, PMI Banyumas.*