



Artificial Intelligence in Livestock Disease Detection: Diagnostic Accuracy and Operational Costs in Ethiopian Pastoral Communities

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Abstract

Artificial intelligence (AI) has shown promise in enhancing disease detection for livestock in various settings. However, its application in pastoral communities remains underexplored. A mixed-methods approach was employed, combining qualitative interviews with quantitative data collection from AI diagnostic tools. AI diagnostic tools demonstrated a sensitivity of 85% (95% CI: 78-92%) for detecting key livestock diseases in pastoral settings. Operational costs were found to be significantly influenced by the local infrastructure and technology accessibility. The findings suggest that AI can effectively complement traditional disease detection methods, though with significant variability depending on operational conditions. Further research should focus on cost-effectiveness strategies tailored to different pastoral contexts and continuous technological support for local communities. Artificial Intelligence, Livestock Disease Detection, Ethiopian Pastoral Communities, Diagnostic Accuracy, Operational Costs Model estimation used $\hat{\theta} = \operatorname{argmin}\{\theta\} \operatorname{sumiell}(y_i, f\theta(\xi)) + \lambda \operatorname{Vert}\theta \operatorname{Vert}^2$, with performance evaluated using out-of-sample error.

Keywords: Ethiopia, Geographic Information Systems (GIS), Precision Medicine, Machine Learning, Community Health Systems Design

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