



A Systematic Review of Point-of-Care Early Infant Diagnosis and Its Impact on the Reduction of Mother-to-Child HIV Transmission in Zambia's Copperbelt Province, 2010

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Abstract

Mother-to-child transmission (MTCT) of HIV remains a significant public health challenge in sub-Saharan Africa. Early infant diagnosis (EID) is critical for timely initiation of antiretroviral therapy. Point-of-care (POC) EID technologies were introduced in Zambia's Copperbelt Province to address delays inherent in centralised laboratory testing, with the potential to reduce MTCT. This systematic review aimed to synthesise evidence to quantify the impact of POC EID implementation on the reduction of MTCT of HIV in the Copperbelt Province. Its objective was to assess changes in key outcomes, including transmission rates, time to diagnosis, and treatment initiation. A systematic search of multiple electronic databases was conducted following PRISMA guidelines. Peer-reviewed articles, reports, and relevant grey literature were included. Studies were screened against pre-defined inclusion criteria, with data extracted and analysed thematically. The quality of included studies was appraised using appropriate tools. The review identified a limited number of qualifying studies. Available evidence suggests a positive association between POC EID implementation and reduced MTCT, though the magnitude of effect varied. A consistent finding was a substantial reduction in the turnaround time for test results. However, robust comparative quantitative data on provincial transmission rates post-implementation were scarce. POC EID shows potential to accelerate the diagnostic process for HIV-exposed infants in the Copperbelt Province. Nevertheless, the current evidence base is insufficient to definitively quantify its specific impact on reducing MTCT rates at a provincial level. Future research should employ stronger study designs to directly measure the impact of POC EID on MTCT incidence. Programme reporting should be strengthened to include standardised outcome metrics.

Investment in health system infrastructure is needed to support sustainable POC EID delivery. HIV, early infant diagnosis, point-of-care, mother-to-child transmission, Zambia, systematic review. This review consolidates the available evidence on POC EID in a high-prevalence setting, highlighting critical evidence gaps and informing future research and policy for the elimination of mother-to-child transmission of HIV.

Keywords: *Early infant diagnosis, Mother-to-child transmission, Point-of-care testing, Sub-Saharan Africa, Antiretroviral therapy, Zambia, Public health*

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