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Assessing the Impact of Solar-Powered Oxygen Concentrators on Paediatric Pneumonia Case-Fatality in Turkana County, Kenya: A 2009 Survey Analysis

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Abstract

Paediatric pneumonia is a leading cause of child mortality in low-resource settings, with hypoxaemia being a critical risk factor. Remote regions like Turkana County, Kenya, face particular challenges in providing reliable oxygen therapy due to unstable grid electricity and logistical constraints. This survey aimed to assess the impact of introducing solar-powered oxygen concentrator (SPOC) systems on paediatric pneumonia case-fatality rates in selected remote healthcare facilities in Turkana County. A cross-sectional survey was conducted across multiple healthcare facilities. Data were collected through a retrospective review of paediatric pneumonia admission registers and key informant interviews with clinical staff. Case-fatality rates before and after the installation of SPOC systems were compared. The introduction of SPOC systems was associated with a reduction in the paediatric pneumonia case-fatality rate. In facilities with established systems, the rate fell to approximately 8%, compared to a reported rate of over 15% prior to implementation in comparable settings. Staff interviews identified improved reliability of oxygen supply as a key contributing factor. The deployment of solar-powered oxygen concentrators in remote, off-grid health facilities is a feasible intervention associated with a decrease in paediatric pneumonia mortality. This technology addresses a critical gap in reliable oxygen therapy. Scale-up of SPOC systems to other remote, low-electrification regions is recommended. Programmes should incorporate robust technical training and maintenance protocols. Further operational research should explore long-term sustainability and cost-effectiveness. pneumonia, paediatrics, oxygen therapy, solar power, case-fatality, Kenya, hypoxaemia, health systems This survey provides empirical evidence from a remote pastoralist setting on the potential of decentralised, renewable energy-based medical technology to improve critical child health outcomes.

Keywords: *Paediatric pneumonia, Hypoxaemia, Case-fatality, Solar-powered oxygen concentrator, Sub-Saharan Africa, Health systems research, Survey methodology*

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