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A Mixed-Methods Investigation of a Clean Cookstove Intervention and Acute Respiratory Infection Frequency in Households of Nyarugusu Refugee Camp, Tanzania

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Abstract

Household air pollution from traditional biomass cooking is a significant risk factor for acute respiratory infections (ARIs), especially in refugee camps. Nyarugusu Refugee Camp in Tanzania, among the world's largest, depends heavily on biomass fuels. Evidence regarding clean cookstove interventions in such humanitarian contexts remains scarce. This study evaluated the effect of a clean cookstove intervention on the frequency of ARI symptoms in households in Nyarugusu Refugee Camp. Its objectives were to quantify changes in reported ARI episodes and to explore user experiences and barriers to sustained cookstove use. A concurrent mixed-methods design was employed. Quantitatively, a quasi-experimental pre-post comparison used a structured survey in 300 intervention households. Qualitatively, 24 in-depth interviews and six focus group discussions were conducted with caregivers to explore contextual factors influencing adoption. Data were integrated during analysis. Quantitative results indicated a 35% reduction in the mean weekly reported ARI episodes among children under five in intervention households following stove distribution. Qualitative analysis identified three key themes influencing sustained use: perceived health benefits, challenges with fuel availability for the new stoves, and intra-household decision-making dynamics. The clean cookstove intervention was associated with a meaningful reduction in reported ARI frequency. However, sustained adoption is influenced by complex practical and social factors extending beyond the technology. Programme implementers should integrate stove distribution with secure fuel supply chains and community-led education addressing gendered use patterns. Future interventions require longer-term support to ensure sustained health benefits. household air pollution, refugee health, acute respiratory infection, clean cooking, humanitarian settings, mixed methods This study provides empirical evidence on the health potential and implementation challenges of clean cookstove programmes in a protracted refugee setting, highlighting the necessity of integrated approaches.

Keywords: *Household air pollution, acute respiratory infections, Sub-Saharan Africa, clean cookstove intervention, mixed methods study, refugee health, paediatric respiratory health*

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