Using Geographic Analysis To Investigate Barriers To Tb Evaluation In Uganda

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Rationale:
Identifying and treating cases of active tuberculosis (**TB**) represents a major challenge for international TB control, particularly in high-burden countries like Uganda, where only 61% of TB patients currently receive a diagnosis. In these settings, patients must travel to centralized health centers to complete the multi-day sputum collection and examination process. We sought to understand the impact of distance on the success of TB suspect evaluation in primary health centers in sub-Saharan Africa.

Objectives:
(1) To develop a measure of the distance traveled to clinic by patients suspected of TB for evaluation in rural Uganda; (2) To describe the relationship between distance traveled and the likelihood of completing TB evaluation.

Methods:
We collected data on TB evaluation services provided to all adults presenting with cough ≥ 2 weeks at six primary health centers in six districts of rural Uganda from January, 2009 to March, 2011. We calculated the distance from the geographic center of the patients' home parish to the health clinic using Euclidean distance in ArcMap version 10 (ESRI, Redlands, CA). We measured the association between distance traveled and likelihood of completing evaluation for TB (≥1 positive, or ≥2 negative microscopic examinations of sputum) using logistic regression adjusted for clustering of data within health clinics. The Makerere University School of Medicine Research Ethics Committee approved the protocol.

Results:
Out of 182,657 patient encounters, 3528 adults (1.9%) were classified as TB suspects (cough ≥ 2 weeks). Sputum smear microscopy for AFB was ordered in 1916/3528 (54.3%) TB suspects. 1470/1916 (76.7%) TB suspects in whom sputum examination was ordered completed sputum evaluation. Median distance from health center to parish was 7.5 km (interquartile range 3.4 km-20.2 km). The distance from health center to home parish did not differ between those who completed TB evaluation and those who did not (OR 1.00 per 1 km increase, 95% CI 0.99-1.01), after accounting for clustering by clinic site.

Conclusions:
Euclidean distance from home to clinic does not predict completion of TB suspect evaluation in rural Uganda. Future studies should evaluate the influence of additional geographic factors, such as land cover, transportation networks, and travel costs, on access to TB diagnostic services.

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