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EPIDEMIOLOGY

Estimating Dementia Prevalence in Rural South Africa with Remote Consensus Diagnoses and Algorithmic Modeling

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Abstract

Background: There is limited population-based data on dementia epidemiology from sub-Saharan Africa, precluding deeper understanding of global dementia burden. The Health and Aging in Africa Study (HAALSI) is designed to address this evidence gap through collection of high-quality longitudinal data on cognition, health, and everyday function in older Black South Africans. Consensus-based diagnoses have become a gold standard for ascertaining dementia status in research settings, however, this approach is resource-intensive and difficult to implement at scale. Here, we utilize algorithmic methods to estimate dementia prevalence and risk factors in a population-representative cohort in rural South Africa.

Method: We utilize data from 4,176 respondents who completed assessments of health, demographics, socioeconomic conditions, cognition, and activities of daily living (ADLs) as part of HAALSI Wave 2 (2018-2019). An enriched sub-cohort (n = 635) later completed clinical and neuropsychological assessments and received diagnostic classification of normal cognition, mild cognitive impairment, or dementia by an expert panel. Logistic regression was used to predict dementia status in the enriched sub-cohort using predictor variables drawn from the parent HAALSI wave. Probability cut points were selected to achieve overall prediction accuracy of at least 80%, prioritizing specificity over sensitivity. Algorithm performance was evaluated across education-level and age subgroups. Coefficients from best-performing algorithms were applied to the full cohort to obtain dementia probability scores and calculate dementia prevalence.

Result: When the enriched sub-sample was reweighted to reflect the full HAALSI population, the estimated prevalence of dementia was 18%. Three models of increasing complexity were tested and showed good discrimination between dementia and non-dementia (ROC = 0.76-0.82). Models were generally more sensitive but less accurate in older and less educated respondents. Algorithmic estimates of dementia prevalence in the HAALSI population ranged from 15-19%. Higher risk for dementia was associated with older age, lower education and wealth, hypertension, living alone, poor self-rated health, widowhood, and immigration status.

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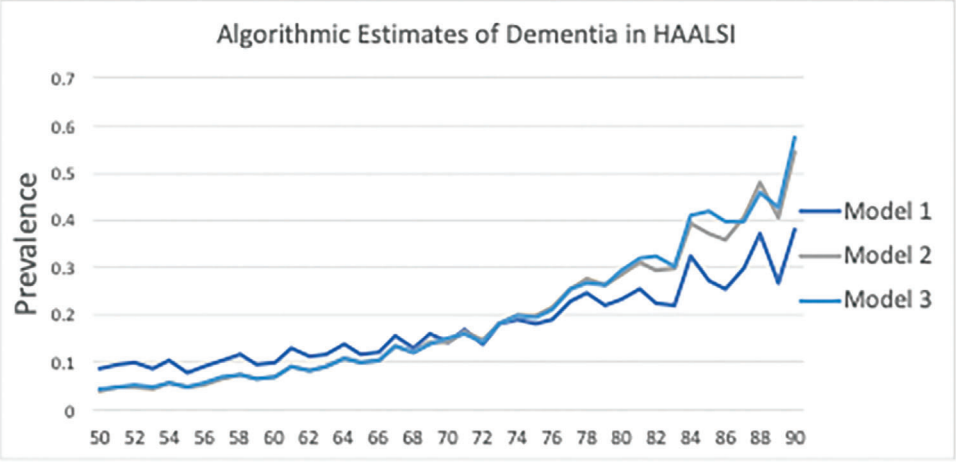
Conclusion: This is one of the first studies to utilize algorithmic methods to describe dementia prevalence in South Africa, producing higher estimates than most previous reports. These efforts may provide a foundation to expand understanding of dementia epidemiology in a region of the world currently experience rapid population aging.

Figure 1. Algorithmic Estimates of Dementia in HAALSI



***Notes*. Model 1 predictors included self-rated memory, immediate word recall, delayed word recall, orientation, and activities of daily living (ADLs); *Model 2 included all Model 1 predictors plus age; Model 3 included all Model 2 predictors plus verbal fluency, days of the week forward-and-back, and instrumental activities of daily living (IADLs).**