

Estimating health service utilization potential using the Supply-Concentric Demand-Accumulation (SCDA) spatial accessibility Index

Tuesday, July 16, 2024 2:40 PM (20 minutes)

The Supply Concentric-Demand Accumulation (SCDA) index is a novel approach to assess the potential for populations in a specific area to access a health service. SCDA operates on the principle that a population's need for available services can only be met after the demand from other populations living closer to the facility has been met. This differs from other ways of estimating spatial accessibility to services, such as the two-step floating catchment area (2SFCA) Index; SCDA estimates are based on the population's ranking of travel costs to services relative to other populations rather than the absolute travel cost. The Centers for Medicare & Medicaid Services provided data about beneficiaries aged ≥ 65 who used pulmonary rehabilitation (PR) to treat chronic obstructive pulmonary disease (COPD) at their chosen facilities in 2014. Using the beneficiaries ($n = 1,105$) who used PR facilities ($n = 45$) in or around Georgia, an SCDA Index was calculated for all Census block groups in Georgia. Moran's I was used to test which spatial accessibility index (the SCDA Index or the 2SFCA Index) was more predictive of the observed geographic pattern of PR utilization. The association between the geographic pattern of the PR utilization and the SCDA Index was ($I=0.607, P<0.001$), which was much higher than the association with the 2SFCA index ($I=0.321, P<0.001$). This suggests that the new SCDA Index may better estimate potential utilization than the more commonly used 2SFCA Index. The SCDA Index can estimate utilization potential for any service in any part of the world where population and service data are available.

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Session Classification: Paper Presentations