

Abstract

This research intends to develop a GIS-based Spatial Equity Assessment Framework due to the absence of a comprehensive and accurate assessment framework. The purpose is to provide guidance for measuring potential accessibility integrating size and then assessing spatial equity integrating quality for social groups at the household level on the city scale.

The research reviews existing studies in planning and health-related fields on disaggregation techniques, potential accessibility and potential spatial access measurement and spatial equity assessment. As the most accurate population weighting technique, the Population Weighted Centroid (PWC) technique suffers from aggregation errors while making population estimation inside Services Areas, an alternative cadastral-based dasymetric population weighting technique, the Household Space Weighting (HSW) technique, is developed. This is tested within a case study of measuring potential accessibility and potential spatial access to GP practices in Newcastle upon Tyne.

The research demonstrates that the HSW technique is more accurate in potential accessibility and potential spatial access measurement. It reduces aggregation errors by taking into account Houses of Multiple Occupancy of residential buildings in use and measures potential accessibility by categorizing the lowest census units available into full access, partial access and no access rather than full access or no access when applying the PWC technique. The case study shows that the PWC technique produces inaccurate population estimation for 325 Output Areas (910 in total in the city) due to its dichotomous categorization of Output Areas and the subsequent aggregation error. When applying the two techniques to measure potential accessibility and potential spatial access, even though the differences in the number of social groups with potential accessibility are small, the differences in the percentage of social groups with potential spatial access are large (with percent differences of 18-22%) on the city scale. This is crucial because it is the percentage of potential spatial access rather than the number of potential accessibility that is used to assess spatial equity for cities on the city scale.

The research develops a GIS-based Spatial Equity Assessment Framework which assesses spatial equity in a more comprehensive and accurate way than previous studies, integrating the size and quality of healthcare services. It also summarizes how to apply the framework to provide policy recommendations for cities on the city scale. The application of the framework has potential to extend from assessing spatial equity of healthcare services to other public services and from potential to realized spatial access.