

Transportation accessibility dilemma in Edmonton. Should we use cumulative or gravity-based measures?

B. Kapatsila^a

^a *School of Urban and Regional Planning, University of Alberta, AB, Canada*

Accessibility, the ease of reaching destinations, has been a part of academic discourse for over six decades, yet, except for a few cities, it hasn't experienced a consistent application in planning practice. Despite being acknowledged for its comprehensive assessment of transport and land-use systems performance, there is a lack of agreement regarding the theoretical framework that the practitioners should use in its application. An argument to keep it simple and easy to interpret is often challenged with the call for more sophisticated and resourceful approaches that are in turn harder to communicate to the public. This study provides evidence to support the reliability of cumulative accessibility, a relatively straightforward measure, by comparing it to a more complex gravity-based accessibility to jobs via motor vehicles and public transport. Both accessibility measures were calculated using census commuting flows, car congested travel time and public transit schedules from Edmonton, Alberta. Cumulative and gravity-based accessibility were estimated at multiple commute time thresholds using decay-probability density functions, decay-cumulative density functions, Gaussian, and a Log-Logistic decay cumulative density functions. The correlation was evaluated between gravity-based measures derived from 4 different decay functions and cumulative accessibility constructed at 24 time points ranging from 5 to 120 minutes for public transit and from 5 to 75 minutes for cars. This analysis was repeated in low-income groups and other income levels to validate if the relationship found is sensitive to equity analysis. The Pearson correlation coefficient reached a value larger than 0.9 when the threshold employed in the cumulative opportunities measure approximated to the mean travel time for every comparison pair for transit and more than 0.75 for cars. The findings provide empirical evidence that cumulative accessibility calculated at the average travel time in Edmonton and for different income groups is similar to gravity-based accessibility. By providing support that bolsters the validity of cumulative accessibility, this research is expected to facilitate the adoption of accessibility evaluation in planning practice for the assessment of transport and land-use interactions and especially for equity purpose.

Corresponding authors: kapatsil@ualberta.ca

ATLAS Student Symposium, April 2022