Geographic access to hospital casualty departments and car ownership – correlation between modelled travel time and self-reported perception of access

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Background

Health service planners often model geographic variation in access to services using road network travel time and distance software. Such models require no information about the target population other than locations. However, the models might not correlate well with patients' perceptions of ease of access and actual travel experiences for patients without cars. We used data from a population health survey to investigate the extent to which respondents' perception of ease of access to hospital casualty departments correlated with modelled travel time.

Methods

The Caerphilly Health and Wellbeing Population Survey asked adult residents of Caerphilly County Borough, population 170,000, located in South East Wales, UK, a range of questions on health-related issues, including the following: 'How well placed do you think your home is for the nearest hospital with a casualty department?' and 'How well placed do you think your home is for the public transport (buses, trains)?' Answers were in the form of a five-point ordinal scale ranging from 'Very well placed' to 'Not at all well placed'. The survey also asked about bands of household income. A total of 12408 residents responded to the survey, giving an overall response of 62.7 percent. The response for individual questions were 61.5 percent for access to casualty departments, 60.9 percent for access to public transport and 57.8 percent for household income.

Caerphilly Borough contains 325 census enumeration districts (ED). Drivetime Version 6.1 software was used to estimate the time needed to travel from the centroid of each respondent's ED of residence to the nearest hospital casualty department. Travel times ranged from one to 24 minutes.

Spearman rank correlation coefficients were calculated for the self-reported access variable and the modelled travel time variable. We stratified the analysis by quintiles of ED-level proportion of households without cars (derived from the 1991 UK census), which ranged from two to 80 percent. We repeated the analysis by three strata of self-reported household income, and in each of the five levels of self-reported ease of access to public transport.

Results

The overall correlation coefficient for self-reported access to casualty departments and modelled travel time was 0.38 ($p<0.05$). This varied across the quintiles of car ownership from 0.31 to 0.49 but no clear trend was apparent. The strongest correlation was for respondents in areas with lowest levels of car ownership. Respondents with best access to public transport had a stronger correlation (0.40) than did those with poorest access to public transport (0.27). Correlation coefficients were similar within each band of household income.

Conclusion

Our travel time model correlated moderately, but significantly, with residents' perception of ease of access to casualty departments. Travel time models may portray geographic access to hospital-based health services differently to that which might be portrayed by the perceptions of target populations. Actual travel experiences of patients may be different again. Geographic access to health services is a complicated dimension but conventional travel time models can offer useful insights into some of the processes involved.