

POSTERS

Equity of access to tertiary hospitals in Wales, UK – a travel time analysis

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ABSTRACT

Patients in Wales requiring treatment in tertiary hospitals typically need to travel to locations in Swansea and/or Cardiff within Wales, or to nearby urban centres in England, such as Bristol, Birmingham and Liverpool. Our study shows the extent to which the geographic configuration of tertiary hospitals in Wales affects access for the total population, for residents of the most deprived 10 percent of areas, and for residents of rural areas. For three illustrative scenarios of hospital locations we calculated population proportions within 30, 60, 90 and 120 minutes, and mean, median and 90th percentile travel times. We found that service configurations have different access implications for different subgroups of the Welsh population. Therefore, access for the total population cannot be assumed to represent access for subgroups of the population. Additionally, comparisons of access between scenarios are highly dependent on which measure of access is the indicator of choice.

Keywords and phrases: travel time, hospital access, deprivation, rural health

1.0 INTRODUCTION

Tertiary level hospital services in Wales are typically provided at the main hospitals in one or both of Wales' two largest centres: Cardiff and Swansea. For example, paediatric neurosurgery is currently provided at both Cardiff and Swansea, but the Specialised Health Service Commission for Wales recently commissioned a study of access implications from centralising services at either Cardiff or Swansea (Christie and Fone 2002). Access studies in Wales have used the geography of the total resident population as a proxy indicator of the geography of future users of services. We sought to show the extent to which travel time analysis results for population subgroups vary from those for the total population, given three hypothetical scenarios of service provision that would be typical options for tertiary level hospital services.

2.0 OBJECTIVES

The objectives of the study were

1. To estimate the distribution of Wales residents, residents in the most deprived 10 percent of areas, and residents in rural areas, by travel time from illustrative tertiary hospital services located at Liverpool, Birmingham, Bristol, and (A) Swansea and Cardiff, (B) Swansea, and (C) Cardiff.
2. To draw conclusions about the impact of the above illustrative scenarios on equity of access for each population.

3.0 METHODS

The analysis included three hypothetical scenarios of service locations. These scenarios comprised services located at the main hospitals in Swansea and Cardiff (Scenario A), Swansea (Scenario B), and Cardiff (Scenario C). Residents of some Welsh areas, particularly in the north and the east of the country, are closer to major urban centres with tertiary hospital services outside Wales, such as Bristol, Birmingham and Liverpool; our analysis included those three locations in all scenarios (Figure 1).

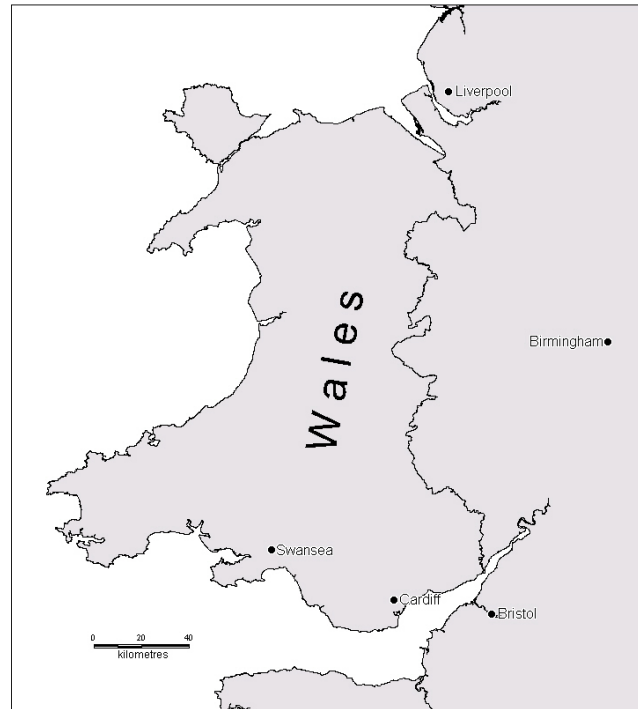


Figure 1: Tertiary hospital locations

Using *Mapinfo Professional Version 6.5* and *Mapinfo Drivetime Version 6.1* software we calculated the cumulative proportions of each population within 30, 60, 90 and 120 minutes travel time of the nearest centre in each scenario. We also calculated the mean, median, and 90th percentile travel times. Travel times are calculated for journeys from the centroid of each enumeration district to the destination.

The default matrix of travel speeds for each road type and setting that is provided with the Drivetime software appeared optimistic even for journeys made in the absence of traffic congestion or other delays. We therefore conducted the analysis with those default speeds reduced by 10 percent. The resulting matrix of travel speeds is shown in Table 1.

Table 1 Travel speed in miles per hour by road type and setting

Road type	Rural	Urban	Inner urban	Conurbation central core
Motorway	59	48	39	33
A-road dual carriageway (c/w)	48	25	20	17
A-road single c/w	36	23	20	17
A-road single c/w passing place	20	17	14	11
B-road dual c/w	39	20	17	14
B-road single c/w	31	17	14	11
B-road single c/w passing place	15	14	13	11
Primary road dual c/w	50	28	23	20
Primary road single c/w	39	23	17	14
Primary road passing place narrow	20	17	14	11
Private road	25	17	14	11
Unclassified road	25	17	14	11

All our population data were aggregated to the level of 1991 census enumeration districts. We assessed geographic access for the following Welsh populations:

1. all residents, estimated for mid-year 2001
2. residents in the most deprived 10 percent of enumeration districts, based on the Wales-standardised Townsend index of socioeconomic deprivation
3. residents in rural enumeration districts, as classified by Office for National Statistics in 1991 (ONS 1992).

4.0 RESULTS

Travel isochrones for the three scenarios and dot density distributions for the three populations are shown in Figures 2, 3 and 4. The most deprived areas tend to be located in South Wales, including the main urban centers of Cardiff and Swansea compared with the total population, whereas residents of rural areas are more uniformly distributed across Wales.

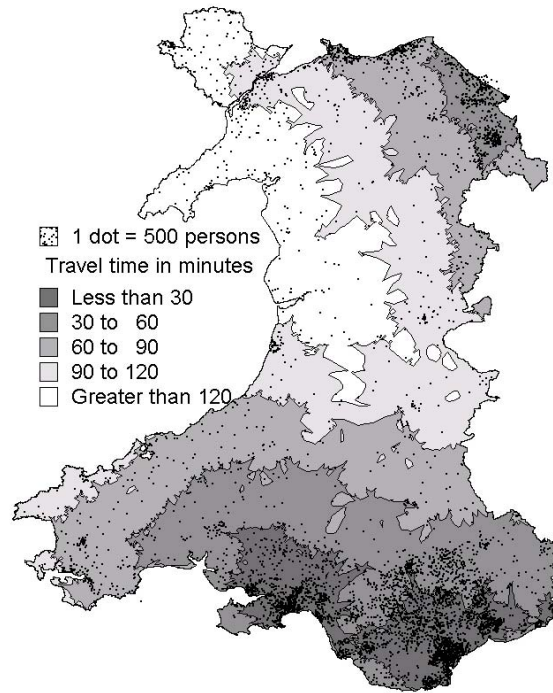


Figure 2: Scenario A isochrones and total population

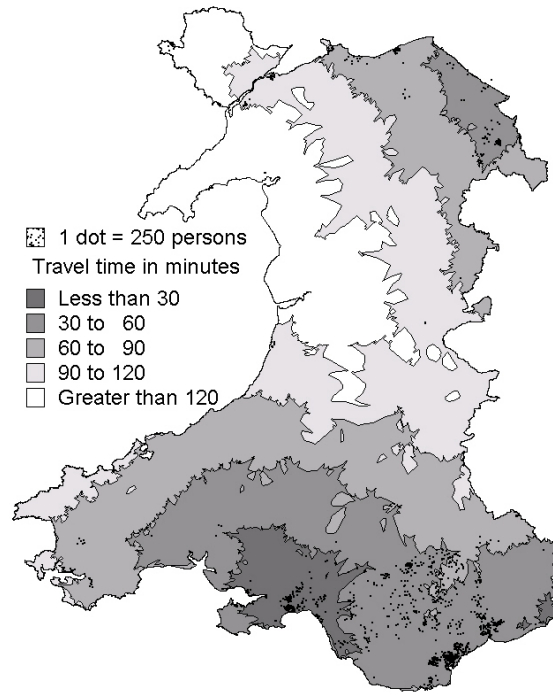


Figure 3: Scenario B isochrones and deprived areas population

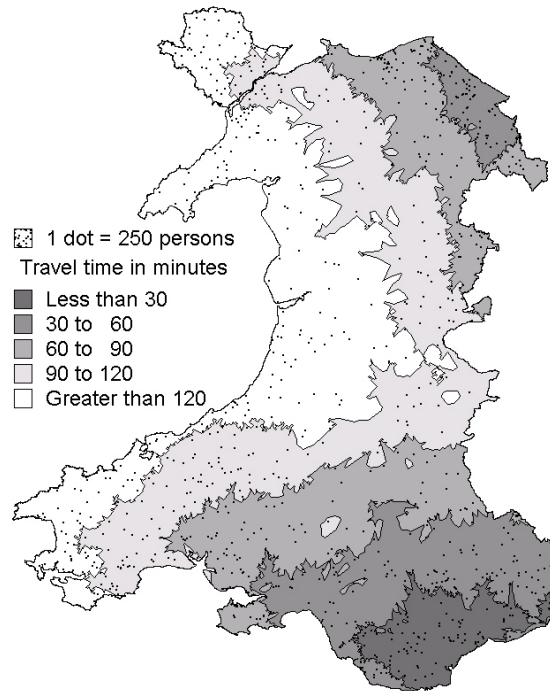


Figure 4: Scenario C isochrones and rural population

Access results for the total resident population, shown in Table 2, reveal that Scenario A, in which services are provided at both Swansea and Cardiff, provides better access for short and medium journeys than either of the other scenarios. However, Scenario B achieves the same population proportions within longer journey times (90 and 120 minutes) and the same 90th percentile travel time as Scenario A. If the proportion within a short journey time, the mean or the median travel time is considered the most important indicator of access, then Scenario C appears to provide better access than Scenario B. The opposite is true is longer journey times or the 90th percentile journey time is considered the most important indicator.

Table 2 Total residents, travel time results

Scenario	Population within travel time (percent)				Travel time (minutes)		
	<30 minutes	<60 minutes	<90 minutes	<120 minutes	Mean	Median	90th percentile
A	51	76	89	95	42	29	95
B	17	69	89	95	56	53	95
C	36	70	83	92	52	43	116

The most deprived 10 percent of enumeration districts are predominantly located in the valleys and urban areas of South Wales. Therefore, relative to the total population, residents of those deprived areas need to make only short journeys to reach the Swansea or Cardiff locations. The mean travel time under Scenario A is 31 minutes for residents of the most deprived areas, compared with 42 minutes for the total resident population (Table 3). Proportions of deprived area residents within 30 and 60 minutes, and the mean and median travel times indicate Scenario C provides better access than Scenario B. Other indicators (for longer journeys) show little difference between those two scenarios.

Table 3 Residents in most deprived 10 percent of Welsh enumeration districts, travel time results

Scenario	Population within travel time (percent)				Travel time (minutes)		
	<30 minutes	<60 minutes	<90 minutes	<120 minutes	Mean	Median	90th percentile
A	63	88	95	98	31	21	74
B	16	79	95	98	51	53	74
C	48	87	93	97	38	31	75

Residents of rural areas on average require longer journeys to reach hospitals located in cities than do urban residents. The mean travel time under Scenario A is 71 minutes for rural residents, that is 29 minutes longer than the mean for the total population (Table 4). All indicators other than the proportion within 30 minutes suggest Scenario B (Swansea) provides better access for the rural population than Scenario C (Cardiff).

Table 4 Residents in rural enumeration districts, travel time results

Scenario	Population within travel time (percent)				Travel time (minutes)		
	<30 minutes	<60 minutes	<90 minutes	<120 minutes	Mean	Median	90th percentile
A	15	43	70	86	71	68	128
B	6	38	70	86	76	70	128
C	10	32	54	75	85	83	136

5.0 CONCLUSIONS

We have illustrated the extent to which access to tertiary hospital services varies within and between Welsh populations. When planning the locations of such services, planners need to be aware that the geography of the total resident population is not representative of the geography of population subgroups; therefore service configurations will have different access implications for those populations. Planners also need to be aware that comparisons of access between scenarios are highly dependent on which measure of access is the indicator of choice.

REFERENCES

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