ACRA(2015)18A

MEETING: Advisory Committee on Resource Allocation

DATE OF MEETING: 18 September 2015

TITLE OF REPORT/PAPER:

ACRA(2015)18A : Unavoidable smallness due to remoteness - identifying remote hospitals

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ACTIONS REQUIRED:

ACRA is asked to support an adjustment to the formula for unavoidably small remote hospitals based on the approach set out in the paper for identifying relevant sites.

ACRA is also asked for advice on the parameters used and for a sense check of the list of hospitals identified

UNAVOIDABLE SMALLNESS DUE TO REMOTENESS: IDENTIFYING REMOTE HOSPITALS

Introduction

1. Previous work by ACRA has found no quantitative evidence to date to support an adjustment to the formula for unavoidably higher costs due to sparsity or remoteness, with the exception of the emergency ambulance cost adjustment[1].

2. The previous work included analyses of reference costs, programme budgeting data, and adjustments in other funding formulae. It also included analysis of applying the adjustment in the Scottish health funding formula to England, but this gave implausible results, such as Milton Keynes being 'remote'.

3. The data for these analyses are far from ideal, such as the cost data are for providers or commissioners as a whole and not broken down by site, and so may be unlikely to be able to distinguish any higher costs in sparsely populated remote areas. In addition, if there are higher costs in remote or sparse areas which are not recognised in the formula, areas are likely to adopt coping strategies to remain in financial balance.

4. The current analysis is focussed on potentially higher costs faced by hospitals which are unavoidably too small to achieve full economies of scale. Furness Hospital in Barrow has been cited as an example, it serves a relatively small population, but other hospitals are too far away to serve Barrow's population. Higher costs due to smallness are not captured by MFF which is focussed on unit input costs, such as staff costs per employee.

5. If providers are inevitably below an economic scale by reason of their remoteness, an adjustment to the formula may be merited to ensure they can be supported by commissioners.

6. The analysis is broken down into two steps, identifying hospitals which are unavoidably small and identifying the higher costs they may face. This paper covers the former, and ACRA(2015)18B the latter.

Approach to identifying remote hospitals

7. The basic approach is to identify:

    a. hospitals which serve a population of under 200,000 people; and

[1] Supply variables are also included in the models to take into account that use of health care services is typically higher the closer the proximity to health care services. The supply variables are set to the national average ('sterilised') when allocations are determined, as supply induced demand is not a valid measure of need. This means that areas further away from health care services have their target allocations adjusted upwards so that estimated need is not reduced due to poorer access. Supply variables do not adjust for sub-scale provision.

b. for these hospitals, the proportion of the population they serve for whom the next nearest hospital is more than 60 minutes driving time away.

8. A population of around 200,000 is taken as the minimum required to achieve economies of scale. Sixty minutes driving time is taken to be the maximum travel time to hospitals for clinical safety reasons for emergency care. Both of these parameters are based on some, albeit limited, advice. Changing these parameters will give different results.

9. The clinical advice includes that from Jonathan Benger, National Clinical Director for Urgent Care, NHS England who supports the two key assumptions: a travel time of one hour and a catchment population of 200,000. He commented also that whilst not strictly evidence-based, these seem to be rational choices that are consistent with current clinical thinking.

10. The proportion of the population served who are more than 60 minutes away from the next nearest hospital provides an indication of whether the hospital is serving a population of under 200,000 for reasons of remoteness or for other reasons. If all of the population served can travel to the next nearest hospital in under 60 minutes, the hospital is not classified as remote in this analysis. On the other hand, if none of the population served can travel to another hospital in under 60 minutes, unavoidable smallness due to remoteness is likely to be (one of) the issues faced by the hospital. There are hospitals between these two extremes, where a proportion of the population they serve is more than 60 minutes from the next nearest hospital.

11. The list of hospitals we have used for the analysis is those providing A&E 24 hours 7 days a week. Hospitals are considered separate providers even if they are part of the same NHS Trust or Foundation Trust. The use of A&E reflects the criterion of 60 minutes as the maximum driving time to hospitals for clinical safety reasons for emergency care.

12. We have used estimated actual travel times by vehicle rather than distance as the crow flies. We have not included travel times by public transport on the basis that an ambulance could be called if other alternatives are not feasible.

13. The population served by a hospital was estimated by the number of people for whom the hospital is their closest to their place of residence.

14. Further details on the methodology are in Annex 1.

Results

15. The table below lists those hospitals serving an estimated population of under 200,000 for which at least some of this population is more than 60 minutes travel time to the second nearest hospital, and the percentage of the population remote on this basis.

16. A number of hospitals are only just below the 200,000 population threshold: these are Pilgrim Hospital in Boston, Hereford County Hospital, Cumberland Infirmary, Scarborough General Hospital, and Royal Shrewsbury Hospital.

Hospital	Location	Total population	% Remote
St Mary's Hospital	Isle of Wight	138,393	100.0%
North Devon District Hospital	Barnstaple, North Devon	169,852	81.0%
Furness General Hospital	Barrow, Cumbria	111,207	61.7%
West Cumberland Hospital	Whitehaven, Cumbria	130,892	42.0%
Pilgrim Hospital	Boston, Lincolnshire	190,677	26.8%
Hereford County Hospital	Hereford, Herefordshire	182,303	23.6%
Cumberland Infirmary	Carlisle, Cumbria	178,338	21.3%
Scarborough General Hospital	Scarborough, North Yorkshire	194,103	10.5%
Hexham General Hospital	Hexham, Northumberland	68,441	5.4%
Dorset County Hospital	Dorchester, Dorset	162,271	4.2%
Royal Shrewsbury Hospital	Shrewsbury, Shropshire	199,154	2.4%
Friarage Hospital	Northallerton, North Yorkshire	81,910	1.4%

17. The size of the population defined as remote is sensitive to the 60 minutes parameter. For example, for Cumberland Infirmary many in the population defined as remote are in the Eden Valley with a travel time to the next nearest hospital in Lancaster or Darlington in the range 60 -70 minutes. Some sensitivity analysis is included further below.

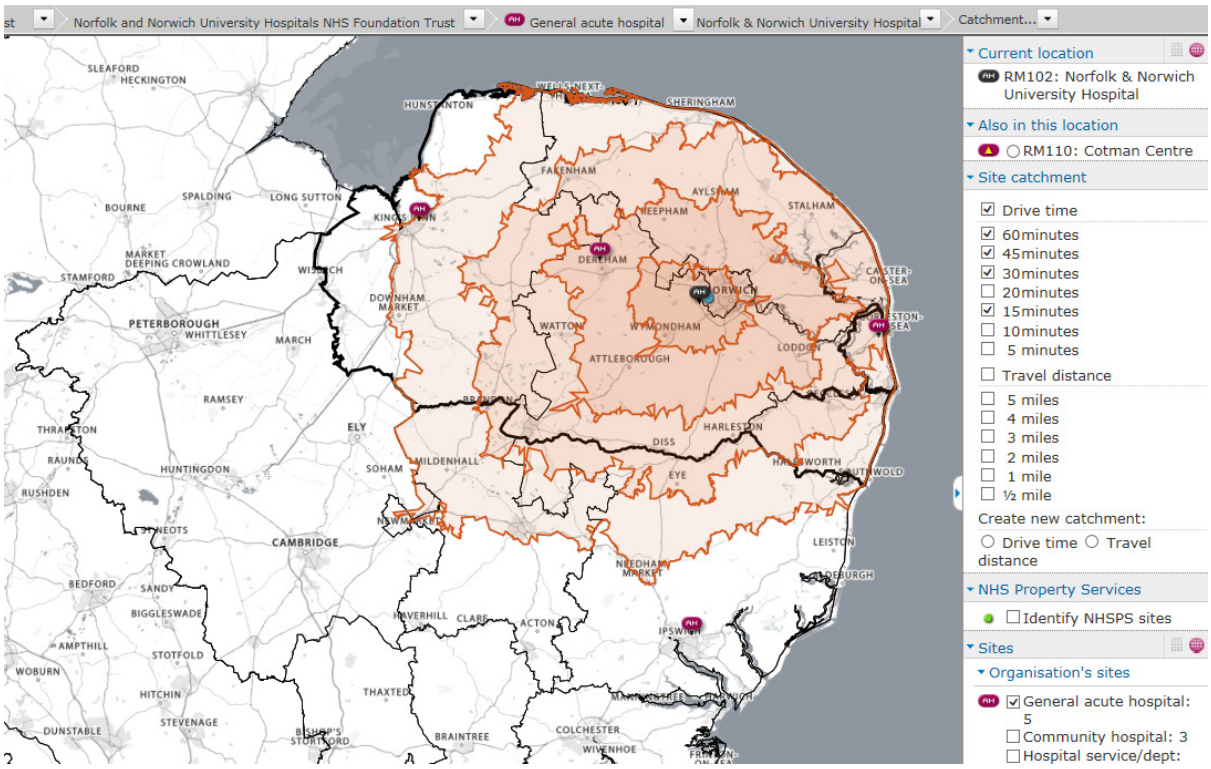
18. Cornwall and North Norfolk do not feature in the table above when it might be expected that they would. We have undertaken further analysis for these two areas.

North Norfolk

19. Norfolk is served by two providers, located in Norwich and Kings Lynn.

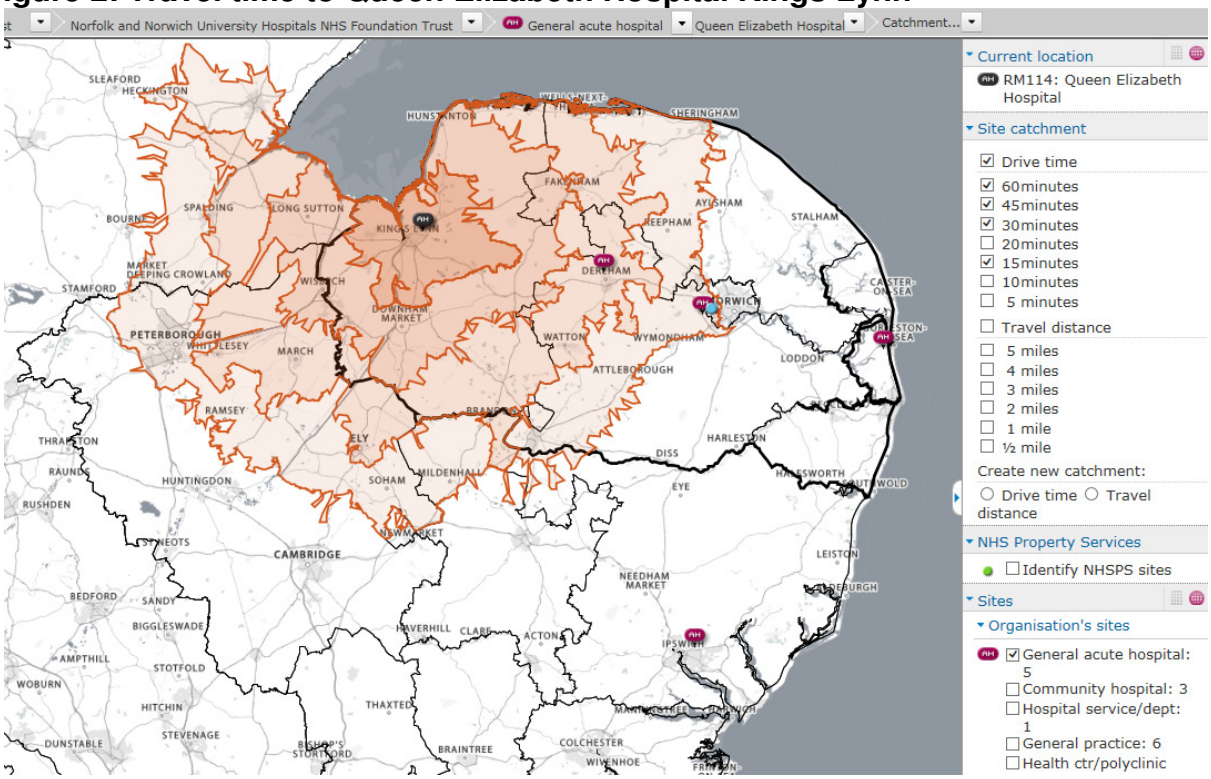
20. Figure 1 shows travel time contours for Norfolk and Norwich University Hospital in Norwich. This is a large teaching hospital serving a population of over 500,000 and anybody living less than sixty minutes from this provider will not be considered as remote in this context.

Figure 1: Travel time to Norfolk and Norwich University Hospital



21. This area is also served by the Queen Elizabeth Hospital in Kings Lynn, which serves a population of over 250,000. Those within one hour of this provider are also not considered remote under our current criteria.

Figure 2: Travel time to Queen Elizabeth Hospital Kings Lynn

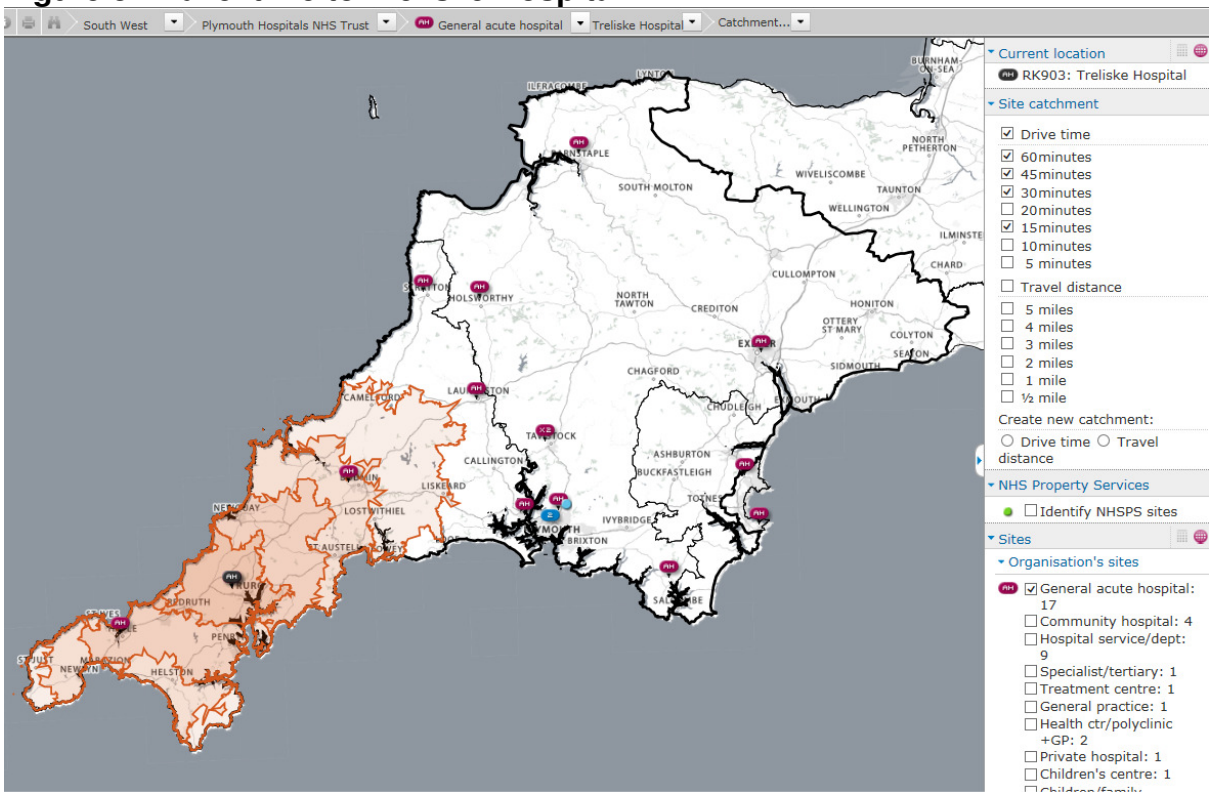


22. Nowhere in Norfolk is more than 60 minutes from either Norfolk and Norwich University Hospital or Queen Elizabeth Hospital. On this basis of the travel times in Figures 1 and 2, it seems unlikely that any minor adjustment to the criteria would result in significant proportions of Norfolk being considered remote.

Cornwall

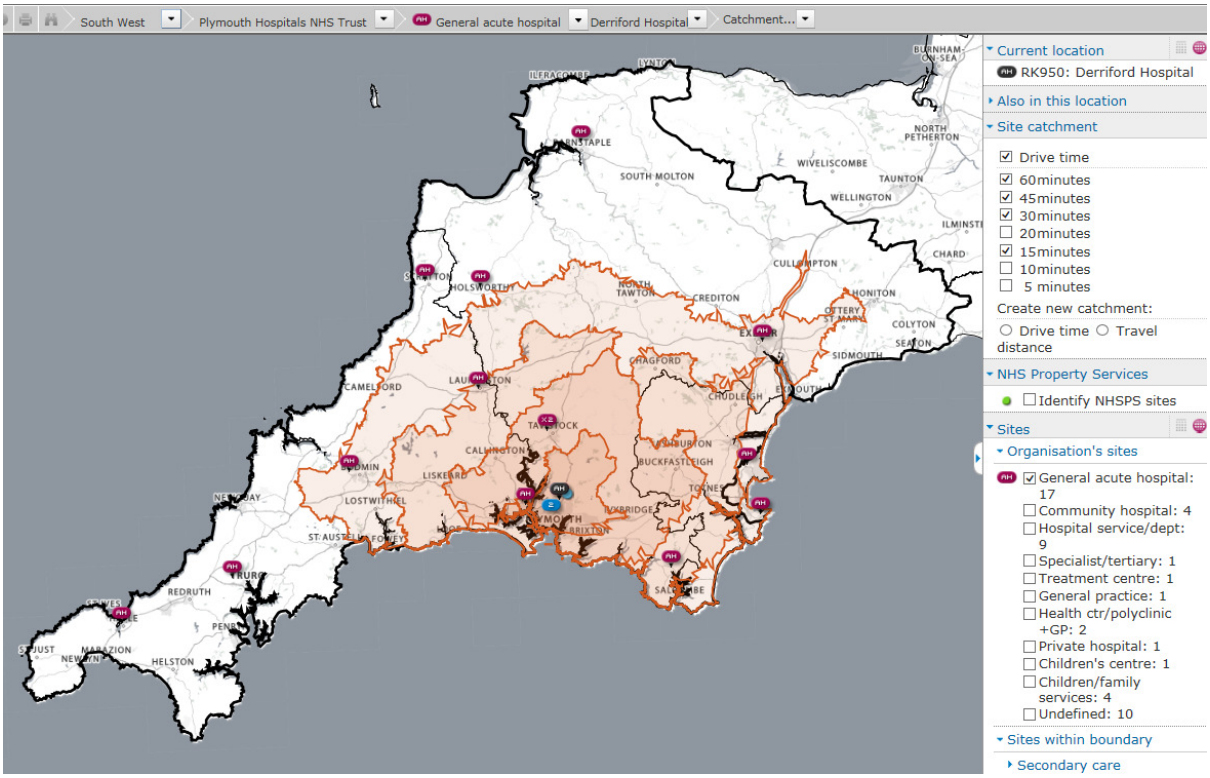
23. The main provider in Cornwall is Treliske Hospital in Truro. The vast majority of Cornwall is within one hour of this provider (Figure 3), serving a population of 420,000 people.

Figure 3: Travel time to Treliske Hospital



24. Most of the area not within one hour of Treliske Hospital is close to Derriford Hospital in Plymouth (Figure 4), which serves a population of over 450,000.

Figure 4: Travel times to Derriford Hospital, Plymouth



25. There is however a strip along the North Coast of Cornwall, broadly running from Camelford up to the border with Devon that is more than an hour from either provider. However, as this population is more than sixty minute from <u>any</u> provider they are not considered to be driving sub-scale provision at a provider. They may however drive other costs, such as enhanced primary care provision, which our current approach does not capture. We do not have good data on these other costs.

Sensitivity to choice of parameters

26. We have explored the impact of adjusting our choice of remoteness criteria and set out here in Annex 2 how this affects those providers considered to serve a remote population and so have a justifiable sub-scale provision.

27. Going from 60 minutes to 45 minutes for the time to second nearest provider has relatively little effect on which providers are considered to serve a remote population. However, it does have a significant impact on the proportion of the population that is remote. For instance, Furness Hospital sees the proportion of its population considered remote rising from 60% to 90% and then to 100% as the travel time threshold moves from 60, to 45 and then to 30 minutes.

28. The size threshold has a bigger effect on which providers are considered to have a subscale provision. For instance, dropping the threshold for full scale provision to 150,000 would see Cumberland Infirmary (Carlisle) no longer considered remote. Increasing it to 300,000 would see Queen Elizabeth Hospital (Kings Lynn) considered sub-scale and West Norfolk CCG would be eligible for an uplift as a result. However, the total population considered to be

served by a sub-scale provider as a result of remoteness is quite insensitive to this change; where increasing the size threshold brings a provider within the criterion the proportion of its catchment that is remote is small.

Annex 1 : Details of methodology

Data Sources

1. There are 3 main components in the model.

2. LSOA areas – LSOA areas have been used as the geography of analysis. There are 32,482 LSOA areas in England with a population of between 1,000 and 3,000. For the purposes of modelling the population weighted centroid (in each LSOA) has been used as the origin of a journey.

3. Major hospital sites – for the purposes of this analysis hospital sites with 24/7 Accident and Emergency provision have been included. This includes 175 hospital sites but excludes specialist hospitals such as children's hospitals.

4. Populations – to calculate the number of people served by each hospital and how many of these are classified as remote a population count is required. The ONS mid-2013 population estimates, which are available at LSOA level, have been used. They are based on place of residence and do not take into account people using hospitals away from their usual place of residence, such as while on holiday.

Travel time model

5. Travel time estimates are based on software which estimates the time taken to travel between two points by road. This software has been used to estimate the travel time between each LSOA area and each hospital site in England.

6. The Mastermap ITN product from Ordnance Survey is the basis for the road network. The modelling uses actual road speeds for individual roads based on data from the Highways Agency for trunk roads and data collected from local authorities by the Department of Transport for local A roads. Speeds for other roads are modelled based on the average speeds that are available.

7. The table below gives the median, 5th and 95th percentiles of speeds for urban and non-urban roads. There are over 4 million individual road segments in the network.

Road type		5th percentile	median	95th percentile
Motorway	Urban	32.5	60.0	70.0
A road	Urban	8.8	25.8	37.2
B road	Urban	11.5	23.1	27.4
Other roads	Urban	11.1	14.4	16.3
Motorway	non-urban	40.0	57.5	70.0
A road	non-urban	24.0	32.0	49.2
B road	non-urban	20.0	28.0	33.5
Other roads	non-urban	17.7	18.4	21.7

8. The travel time model produces an estimate for the time taken to travel to different hospital sites. At certain times of the day / periods of the year the actual time taken may be higher or lower than these estimates due to prevailing road conditions.

Analysis

9. The travel time model has generated travel times from each LSOA area to each hospital site in England. A process has then been established to determine whether or not an area is classified as remote.

10. For each LSOA area the closest hospital is identified. This is used to determine the population which each hospital serves. An assumption is made that the minimum number of residents for a hospital to be sustainable, in the current analysis this is 200,000 people. The purpose of the size threshold is to remove those hospitals who may serve a remote but large population. For example the main hospital in Cornwall is a significant distance from the next closest provider, however the population is large enough at over 400,000 for it to be sustainable.

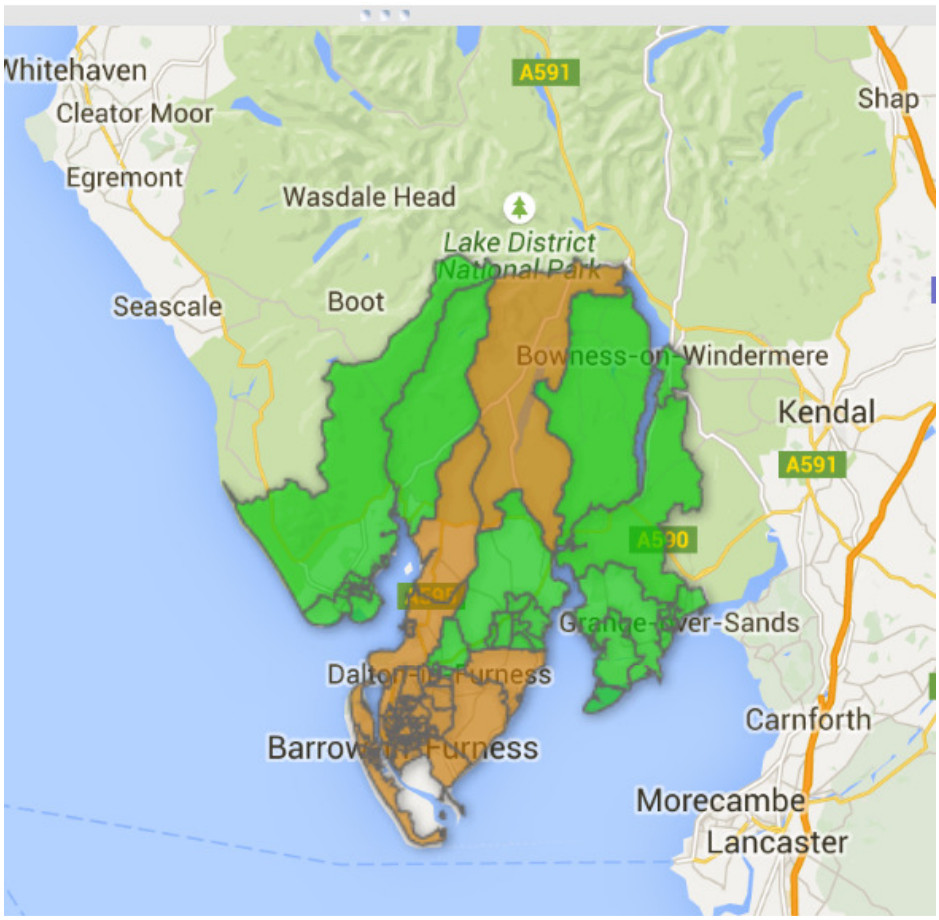
11. For each LSOA the time to the second closest hospital is calculated. If the time to the second closest hospital is more than a given threshold (currently set at 60 minutes) the population in the LSOA is classified as being remote. The LSOAs which are more than 60 minutes from any hospital site were excluded from this stage of the analysis - this affects around 40 LSOAs in England. This decision was made on the basis that these LSOA's are not served by any hospital site.

12. For those hospitals serving fewer than 200,000 people the number, and proportion, of individuals classified as remote is calculated. This proportion is used to inform the extent to which a site is classified as being subject to remoteness.

Worked example – Furness General Hospital, Barrow

13. The first stage involves finding those LSOA areas which are served by Furness General. This is based on those LSOAs where the nearest (on travel time basis) hospital is in Barrow. 77 LSOAs were identified as being in this group. The population of these LSOAs is calculated as being around 110,000.

29. The second stage involves determining which of these LSOAs is classified as being remote. This is done by looking at the second closest hospital for each LSOA. If the second closest is more than 60 minutes away then the LSOA is classified as being remote. For Barrow, 50 of the 77 LSOA areas were classified as being remote. This split is shown on the map below – areas highlighted green are "not remote" whereas areas shaded orange are more than 60 minutes from the second closest provider. Other hospital sites are located in Whitehaven and Lancaster.


Whitehaven
Cleator Moor
Egremont
Wasdale Head
A591
Shap
Lake District
National Park
Seascale
Boot
Bowness-on-Windermere
Kendal
A591
A590
Grange-over-Sands
Dalton-in-Furness
Barrow-in-Furness
Carnforth
Morecambe
Lancaster

Annex 2: Sensitivity analysis

Sensitivity to travel time

Site	Population Served	30 Minutes / 200,000 Population		45 Minutes / 200,000 Population		60 Minutes / 200,000 Population Baseline	
		Population Remote	Remote %	Population Remote	Remote %	Population Remote	Remote %
SCARBOROUGH GENERAL HOSPITAL	194103	194103	100.0%	171,595	88.4%	20,347	10.5%
PILGRIM HOSPITAL	190677	190677	100.0%	138,679	72.7%	51,009	26.8%
HEREFORD COUNTY HOSPITAL	182303	182303	100.0%	152,792	83.8%	42,973	23.6%
CUMBERLAND INFIRMARY	178338	178338	100.0%	156,457	87.7%	37,968	21.3%
ST MARY'S HOSPITAL	138393	138393	100.0%	138,393	100.0%	138,393	100.0%
WEST CUMBERLAND HOSPITAL	130892	130892	100.0%	122,777	93.8%	54,937	42.0%
FURNESS GENERAL HOSPITAL	111207	111207	100.0%	101,571	91.3%	68,600	61.7%
DORSET COUNTY HOSPITAL	162271	152007	93.7%	62,747	38.7%	6,846	4.2%
SALISBURY DISTRICT HOSPITAL	157850	142691	90.4%	23,593	14.9%		
NORTH DEVON DISTRICT HOSPITAL	169852	152700	89.9%	152,700	89.9%	137,611	81.0%
SCUNTHORPE GENERAL HOSPITAL	171935	146546	85.2%	1,325	0.8%		
FRIARAGE HOSPITAL SITE	81910	66355	81.0%	11,705	14.3%	1,132	1.4%
HARROGATE DISTRICT HOSPITAL	184630	145229	78.7%	9,376	5.1%		
CONQUEST HOSPITAL	174384	127894	73.3%	5,603	3.2%		
HORTON GENERAL HOSPITAL	159212	106576	66.9%	8,793	5.5%		
HEXHAM GENERAL HOSPITAL	68441	42428	62.0%	10,441	15.3%	3,697	5.4%
SOUTHPORT & FORMBY DISTRICT GENERAL HOSPITAL	161244	92285	57.2%				
ROYAL SHREWSBURY HOSPITAL	199154	109808	55.1%	52,180	26.2%	4,716	2.4%

Site	Population Served	30 Minutes / 200,000 Population		45 Minutes / 200,000 Population		60 Minutes / 200,000 Population Baseline	
		Population Remote	Remote %	Population Remote	Remote %	Population Remote	Remote %
ST RICHARD'S HOSPITAL	198165	107183	54.1%	1,280	0.6%		
AIREDALE GENERAL HOSPITAL	180607	84942	47.0%	14,118	7.8%		
HINCHINGBROOKE HOSPITAL	195358	72998	37.4%	2,669	1.4%		
BASSETLAW HOSPITAL	143960	45321	31.5%	2,316	1.6%		
MACCLESFIELD DISTRICT GENERAL HOSPITAL	157675	43874	27.8%	1,670	1.1%		
ALEXANDRA HOSPITAL	185277	44864	24.2%				
QUEEN'S HOSPITAL, BURTON UPON TRENT	196888	36723	18.7%				
CHELTENHAM GENERAL HOSPITAL	173097	28517	16.5%	3,913	2.3%		
STAFFORD HOSPITAL	145168	17461	12.0%	1,328	0.9%		
STOCKPORT NHS FOUNDATION TRUST	192181	15129	7.9%				
GEORGE ELIOT HOSPITAL - ACUTE SERVICES	191438	8445	4.4%				

Sensitivity to population served for full economic scale

		60 Minutes / 300,000 Population		60 Minutes / 250,000 Population		60 Minutes / 200,000 Population Baseline		60 Minutes / 150,000 Population	
Site	Popn Served	Popn Remote	Remote %	Popn Remote	Remote %	Popn Remote	Remote %	Popn Remote	Remote %
ST MARY'S HOSPITAL	138,393	138,393	100%	138,393	100%	138,393	100%	138,393	100%
NORTH DEVON DISTRICT HOSPITAL	169,852	137,611	81.0%	137,611	81.0%	137,611	81.0%		
FURNESS GENERAL HOSPITAL	111,207	68,600	61.7%	68,600	61.7%	68,600	61.7%	68,600	61.7%
WEST CUMBERLAND HOSPITAL	130,892	54,937	42.0%	54,937	42.0%	54,937	42.0%	54,937	42.0%
PILGRIM HOSPITAL	190,677	51,009	26.8%	51,009	26.8%	51,009	26.8%		
HEREFORD COUNTY HOSPITAL	182,303	42,973	23.6%	42,973	23.6%	42,973	23.6%		
CUMBERLAND INFIRMARY	178,338	37,968	21.3%	37,968	21.3%	37,968	21.3%		
THE QUEEN ELIZABETH HOSPITAL	256,816	30,971	12.1%						
SCARBOROUGH GENERAL HOSPITAL	194,103	20,347	10.5%	20,347	10.5%	20,347	10.5%		
QUEEN ELIZABETH THE QUEEN MOTHER HOSPITAL	291,861	29,244	10.0%						
MUSGROVE PARK HOSPITAL	254,023	21,400	8.4%						
HEXHAM GENERAL HOSPITAL	68,441	3,697	5.4%	3,697	5.4%	3,697	5.4%	3,697	5.4%
DORSET COUNTY HOSPITAL	162,271	6,846	4.2%	6,846	4.2%	6,846	4.2%		
DIANA, PRINCESS OF WALES HOSPITAL	219,120	7,321	3.3%	7,321	3.3%				
ROYAL SHREWSBURY HOSPITAL	199,154	4,716	2.4%	4,716	2.4%	4,716	2.4%		
DARLINGTON MEMORIAL HOSPITAL	243,687	5,699	2.3%	5,699	2.3%				
WANSBECK HOSPITAL	213,096	3,510	1.6%	3,510	1.6%				
FRIARAGE HOSPITAL SITE	81,910	1,132	1.4%	1,132	1.4%	1,132	1.4%	1,132	1.4%
LINCOLN COUNTY HOSPITAL	241,616	2,079	0.9%	2,079	0.9%				