

# Inequalities in cancer survival: Spearhead Primary Care Trusts are appropriate geographic units of analyses

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## Abstract

### Background

Cancer survival in Spearhead Primary Care trusts (PCTs) is lower than in the rest of England for most common cancers, but differences are smaller than the more substantial survival gradients between deprived and affluent populations using small-area measures of deprivation. The way in which Spearhead PCTs were designated may give an unduly favourable image of inequalities in cancer survival.

### Methods

Five-year age-standardised relative survival for 10 common cancers was estimated separately for patients resident in Spearhead local authorities (LAs), Spearhead PCTs, and the rest of England. Differences in survival between Spearhead and other LAs and the corresponding differences between Spearhead and other PCTs were compared.

### Results

Cancer survival was consistently lower for patients resident in Spearhead areas than in the rest of England for the majority of cancers, regardless of the geographic unit used. Survival was lower in Spearhead LAs than Spearhead PCTs for 11 of the 16 cancer-sex combinations examined. As a consequence, the survival gap between the Spearhead areas and the rest of England was slightly wider when the definition of Spearhead was based on LAs rather than PCTs, but the two contrasts provide a very similar picture.

### Conclusions

Small differences were found between using Spearhead LAs and Spearhead PCTs in the estimation of cancer survival, but results were inconsistent. Although the overlap between the two geographies is imperfect, Spearhead PCTs are appropriate geographic units for monitoring inequalities in cancer survival. However, given the instability of NHS geographical boundaries, Spearhead LAs could be a suitable alternative geographic unit.

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## Background

The ‘Spearhead’ group of 70 LAs and 62 PCTs was introduced in 2004, as the focus of government interventions designed to reduce health inequalities (Department of Health, 2004). Spearhead LAs were seen as facing the greatest health challenges, on the basis that their populations were in the lowest fifth of the 354 LAs in England for three or more selected indicators: male and female life expectancy at birth, cardiovascular disease and cancer mortality rate in the under 75s, and Index of Multiple Deprivation 2004 average score. The designation of Spearhead PCTs was indirect, in that the territory of the PCTs overlapped **at least partly** with the territory of Spearhead LAs.

Some PCTs acquire the Spearhead designation despite having only a small geographic overlap with a Spearhead LA, and this may give an unduly favourable image of health inequalities. Where only a small proportion of the resident population of a PCT lies within the LA from which it derives Spearhead status, the rest of the PCT population may be comparatively affluent. This could lead to overestimation of survival in Spearhead PCTs compared with that in truly deprived groups. Any observed deficit in survival between Spearhead and non-Spearhead PCTs could thus be an underestimation of the ‘real’ survival deficit.

Inequalities in cancer survival are well documented in England. Cancer patients resident in Spearhead PCTs have significantly lower survival than in all other PCTs (Ellis *et al.*, 2009), although studies using small-area measures of deprivation have identified more substantial survival gradients between deprived and affluent populations (Coleman *et al.*, 2004; Rachet *et al.*, 2008).

We have therefore compared differences in cancer survival between populations in Spearhead and other LAs and the corresponding differences between populations resident in Spearhead and other PCTs. These comparisons will provide insight into the impact of different geographical boundaries on cancer survival indicators.

## Methods

Cancer incidence data were provided by the National Cancer Registry at the Office for National Statistics. Analyses included all adults (aged 15–99) resident in England who were diagnosed during 2000–2004 (before the introduction of the Spearhead group) with one of ten common cancers (bladder, breast, cervix, colon, lung, oesophagus, ovary, prostate, rectum, stomach) as a first, primary, malignant neoplasm, and who were followed up until 31 December 2005 (see Rachet *et al.* 2008 for details of exclusion criteria).

Five-year age-standardised relative survival for each cancer was estimated separately for patients resident in Spearhead and all other LAs, and Spearhead and all other PCTs. Relative survival is the ratio of the observed (crude) survival of the cancer patients and the survival that would have been expected if those patients had experienced only the same age and sex-specific mortality rates (background mortality) as the general population from which they are drawn (Estève *et al.*, 1990; Ederer *et al.*, 1961; Cutler and Ederer, 1958). Life tables containing all-cause mortality rates by single year of age, sex, Government Office Region (GOR) and deprivation category were used

to represent background mortality. A maximum likelihood approach of calculating crude and relative survival from individual tumour records was applied (Estève *et al.*, 1990), using an algorithm developed for previous analyses (Coleman *et al.*, 1999).

The difference in relative survival between patients in Spearhead LAs or PCTs and in the rest of England is expressed as a percentage. The difference is shown as negative if survival is lower in Spearhead LAs or PCTs than in the rest of England.

## Results

Among all the cancer patients diagnosed in England during 2000–2004, 200,059 (28 per cent) were resident in Spearhead LAs, and 257,524 (36 per cent) were resident in Spearhead PCTs, an additional 57,465 patients. Twenty two per cent of cancer patients resident in Spearhead PCTs were not resident in Spearhead LAs.

Survival was lower in the Spearhead areas (whether defined by PCT or LA) than in the rest of England for most of the 16 cancer-sex combinations examined. The exceptions were cancers of the stomach (men), ovary, and prostate, where survival was higher in the Spearhead areas than the rest of England, although these differences were not statistically significant (Table 1).

Table 1 **Five-year age-standardised relative survival for adults diagnosed during 2000–04 and followed up to 2005, 10 common cancers, by sex: Spearhead LAs, Spearhead PCTs and the rest of England**

England														Numbers
Cancer <sup>1</sup>		Spearhead LAs		Rest of England		p-value	Spearhead PCTs		Rest of England		p-value	p-gap <sup>3</sup>		
		No. of cases	%	No. of cases	%		No. of cases	%	No. of cases	%				
Bladder	M	8,239	56.4	21,216	58.0	-1.6	0.14	10,509	57.0	18,945	57.8	-0.8	0.44	-0.8
	W	3,439	45.2	8,130	48.1	-2.8	0.00	4,308	44.8	7,261	48.4	-3.6	0.00	0.8
Breast	W	42,521	80.1	124,069	81.2	-1.1	0.01	56,178	80.5	110,401	81.2	-0.7	0.04	-0.4
Cervix	W	3,955	63.2	7,499	63.9	-0.6	0.60	4,791	63.3	6,664	64.0	-0.7	0.55	0.1
Colon	M	11,222	47.0	30,974	49.5	-2.5	0.01	14,794	47.7	27,423	49.5	-1.9	0.03	-0.6
	W	10,251	48.8	30,228	50.3	-1.5	0.07	13,569	49.3	26,903	50.2	-0.9	0.26	-0.6
Lung	M	27,721	6.6	55,084	6.6	-0.1	0.73	33,872	6.5	48,935	6.7	-0.1	0.65	0.0
	W	19,543	8.0	35,471	8.4	-0.4	0.25	23,377	8.2	31,629	8.4	-0.2	0.55	-0.2
Oesophagus	M	5,069	9.4	13,569	10.2	-0.8	0.03	6,612	9.7	12,026	10.2	-0.5	0.07	-0.3
	W	3,018	8.7	7,681	10.5	-1.8	0.00	3,921	9.1	6,778	10.5	-1.4	0.12	-0.4
Ovary	W	6,873	39.8	19,445	38.5	1.3	0.14	9,159	39.8	17,161	38.3	1.5	0.06	-0.2
Prostate	M	32,067	75.7	98,074	75.3	0.4	0.52	42,959	75.4	87,182	75.4	0.1	0.92	0.4
Rectum	M	9,123	48.6	21,965	52.4	-3.8	0.00	11,896	49.1	19,189	52.7	-3.6	0.00	-0.2
	W	5,519	53.0	14,439	53.9	-0.9	0.47	7,264	53.4	12,691	53.8	-0.4	0.70	-0.4
Stomach	M	7,349	14.2	14,556	13.5	0.7	0.37	9,209	14.2	12,697	13.3	0.9	0.19	-0.3
	W	4,150	15.9	7,763	16.6	-0.7	0.52	5,106	16.0	6,807	16.6	-0.6	0.55	-0.1

1 Cancers defined by codes in the International Classification of Diseases, tenth revision (ICD-10)

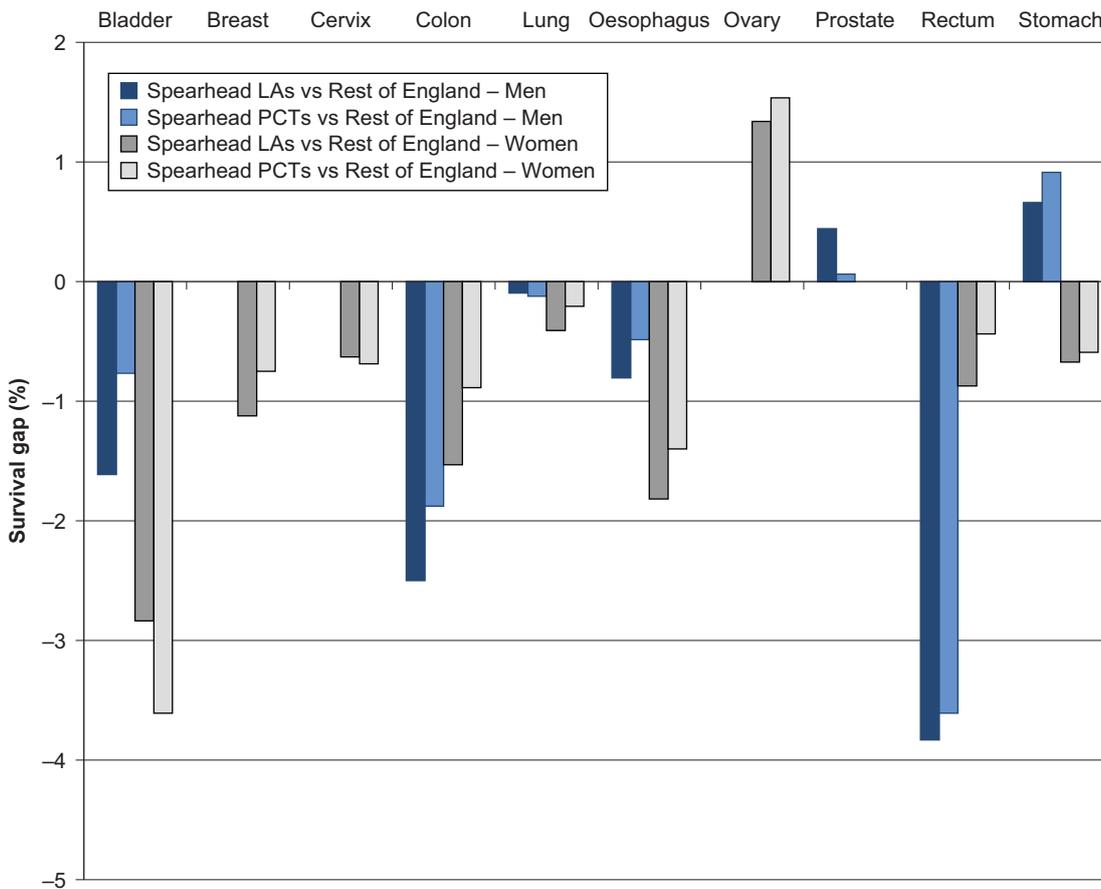
2 The difference between the relative survival for patients resident in Spearhead LAs or PCTs and relative survival for those in the rest of England.

3 The difference between the survival gap when analyses are performed using LAs and PCTs

4 These survival estimates are not age-standardised due to small numbers of cases in some age strata

Five-year survival was lower in Spearhead LAs than Spearhead PCTs for 11 of the 16 cancer-sex combinations examined, although absolute differences were minimal (-0.1% to -0.7%). As a consequence, the difference in survival between the Spearhead areas and the rest of England (the survival gap) was slightly wider when the definition was based on LAs rather than PCTs (Figure 1).

**Figure 1** Difference in five-year age-standardised relative survival for adults diagnosed during 2000–04, 10 common cancers, by sex: Spearhead LAs vs Rest of England and Spearhead PCTs vs Rest of England



Somewhat larger differences are seen for cancers of the bladder (men) and colon (both sexes), where the survival gap differs by -0.8 per cent and -0.6 per cent, respectively, between Spearhead LAs and Spearhead PCTs. Conversely, for six other cancer-sex combinations, the survival gap was slightly wider when analyses are performed using Spearhead PCTs. Even the largest differences between PCT-based and LA-based comparisons for cancer of the bladder (0.8 per cent) in women and for prostate cancer (0.4 per cent) are still small.

## Discussion

These results show that for most common cancers, the deficit in five-year survival between Spearhead LAs and the rest of England is indeed slightly wider than between Spearhead PCTs and the rest of England. Health policies designed to reduce inequalities, based as they are on Spearhead PCTs, will thus be slightly easier to achieve than if they had been based on Spearhead Local Authorities, at least for cancer survival. However, the differences between using Spearhead LAs or Spearhead PCTs to estimate the survival gap are small.

We had assumed that the designation of Spearhead PCTs would result in an underestimation of the survival deficit between deprived and affluent populations, presenting an unduly favourable image of the gap in cancer survival at baseline. Whilst slight differences were found between using Spearhead LAs and Spearhead PCTs in the estimation of cancer survival, the results were neither consistent enough, nor large enough, to support this concern.

These analyses do show that survival is consistently lower for patients resident in Spearhead areas than in the rest of England for the majority of cancers, regardless of the geographic unit used, although previous analyses suggest that the gap in survival was narrowing even before the introduction of the Spearhead Group in 2004 (Ellis *et al.*, 2009).

## Conclusion

The gap in five-year survival between Spearhead LAs and the rest of England is slightly wider than between Spearhead PCTs and the rest of England. Differences are small however, and we conclude that Spearhead PCTs are an acceptable geographic unit for monitoring inequalities in cancer survival.

However, in July 2010 the Government White Paper 'Equity and excellence: liberating the NHS' proposed the abolition of Primary Care Trusts, replacing them with new local GP consortiums (Department of Health, 2010). The impact of this restructuring on the Spearhead Group is as yet unknown. Given the small differences in cancer survival estimated using PCTs and LAs reported here, Spearhead LAs would appear to be a suitable alternative geographic unit.

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## Competing interests

None

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