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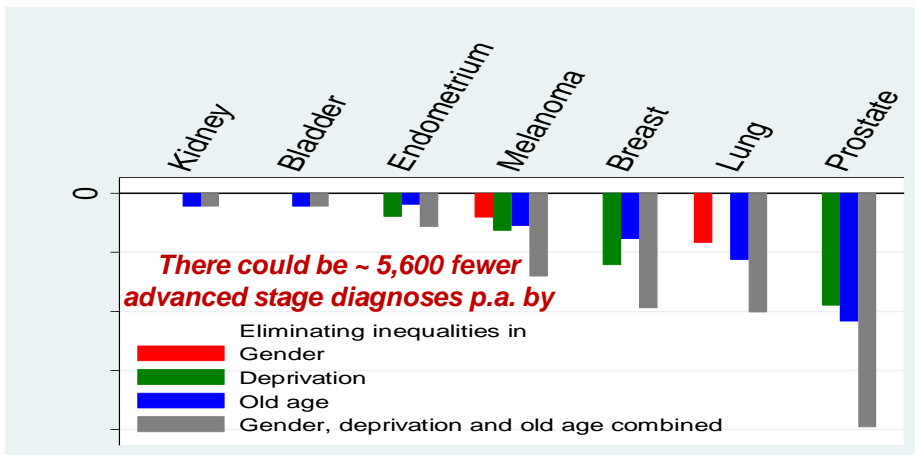
How much of the deprivation gap in cancer survival can be explained by variation in stage at diagnosis: an example from breast cancer.

David Greenberg^{1,5,6}, Mark Rutherford^{2,3}, Sally Hinchliffe², Gary Abel^{5,6}, Georgios Lyrtzopoulos^{5,6} & Paul Lambert^{2,4}



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Deprivation is strongly associated with inequality in stage at diagnosis¹



¹Lyrtzopoulos G, Abel GA, Brown CH, Rous BA, Vernon SA, Roland M, Greenberg DC. *Ann Oncol* 2012; 24(3): 843-50

² Stage at diagnosis and the deprivation gap in cancer survival



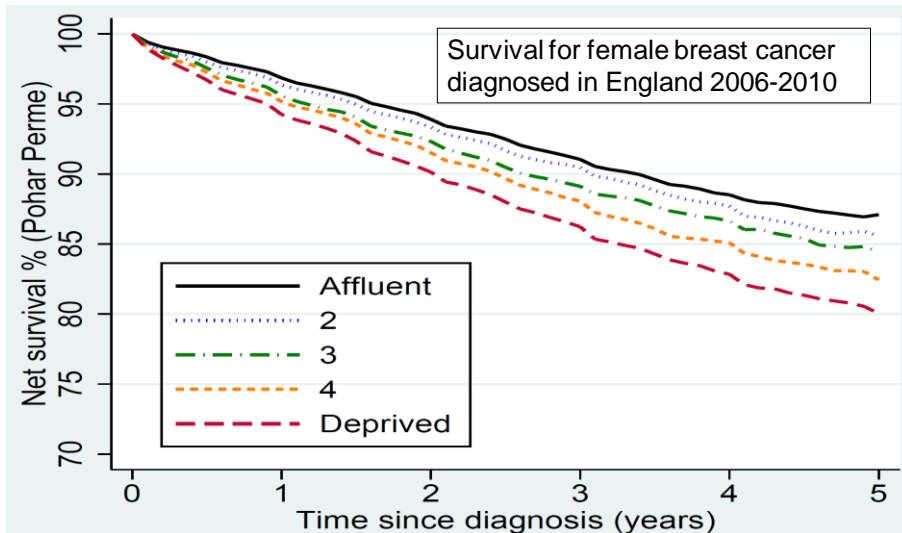
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Deprivation is strongly associated with inequality in breast cancer survival



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Deprivation is strongly associated with inequalities in avoidable excess deaths for breast cancer

- Recent work² has shown that around 650 excess deaths would be avoidable in England within three years from diagnosis if breast cancer survival were for all deprivation groups was high as in the most affluent category, probably due to differences in
 - uptake of screening
 - stage at diagnosis
 - level of comorbidity
 - access to optimal treatment
- Understanding the extent to which these survival inequalities reflect differences in stage at diagnosis is important to guide appropriate policies.

². Libby Ellis, Michel Coleman, Bernard Rachet, *European Journal of Cancer* 48 (2012) 270–278

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Objective

- To estimate the number of deaths in English women with breast cancer that could be avoided within five years from diagnosis
 - if it were possible to eliminate socioeconomic differences in stage at diagnosis.

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Data

- 22,477 women resident in the East of England with a first diagnosis of breast cancer at age 30+ in 2006-2010
 - Stage 1: 8595 cases (38.3%)
 - Stage 2: 9124 cases (40.6%)
 - Stage 3: 1999 cases (8.9%)
 - Stage 4: 1030 cases (4.6%)
 - Stage not known: 1699 cases (7.6%)

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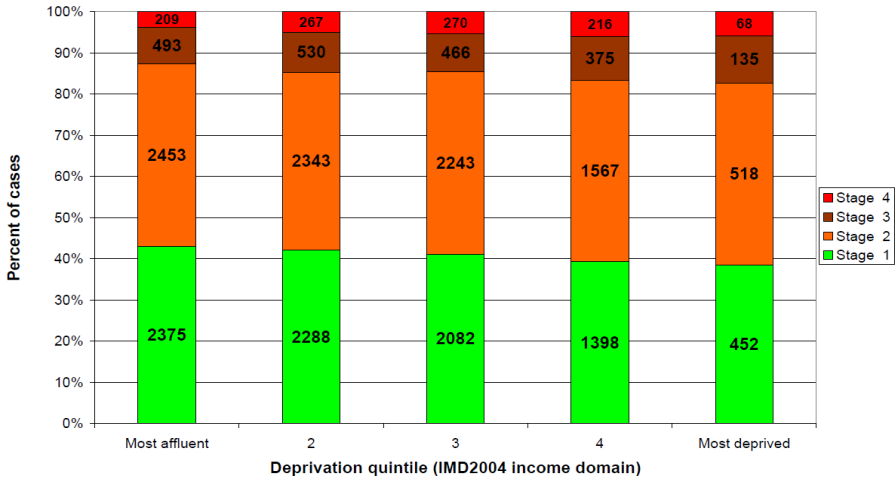




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Data

TNM Stage at diagnosis for breast cancer diagnosed 2006-2010 in women aged 30 and over in the East of England

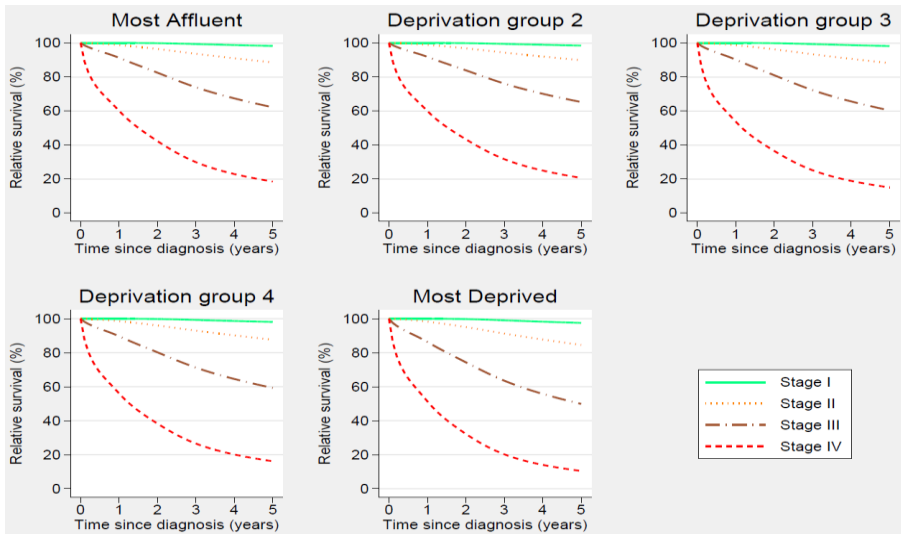


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Survival for female breast cancer diagnosed in the East of England 2006-2010



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Methods

- Excess mortality (hazard) rate ratios were estimated using a flexible parametric model
- A life table for the East of England stratified by deprivation quintile was used
- Two sets of stage-standardised relative survival estimates were calculated for each deprivation and age group (30-49, 50-54, 55-59.....80-84,85+)
 - Standardised to the observed stage distribution
 - Standardised to the stage distribution in the most affluent deprivation quintile

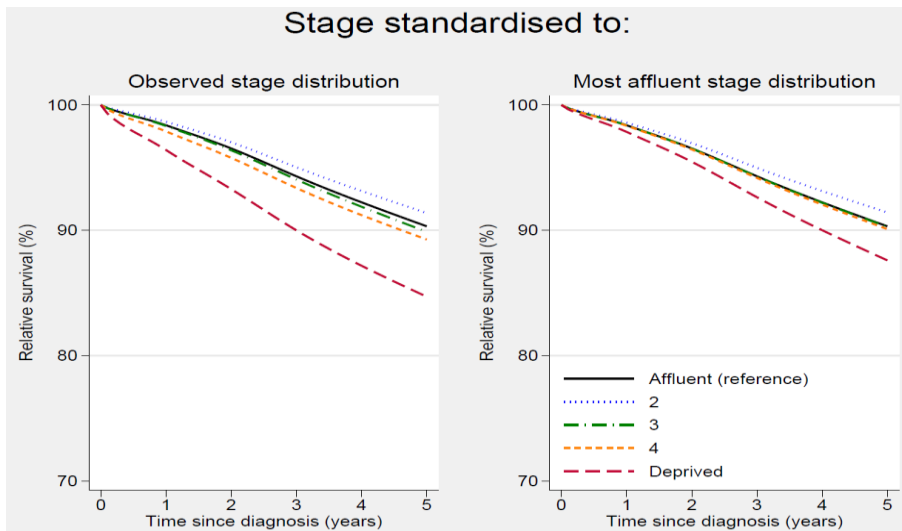
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Survival for breast cancer diagnosed at age 55-59 in the East of England 2006-2010

Stage standardised to:



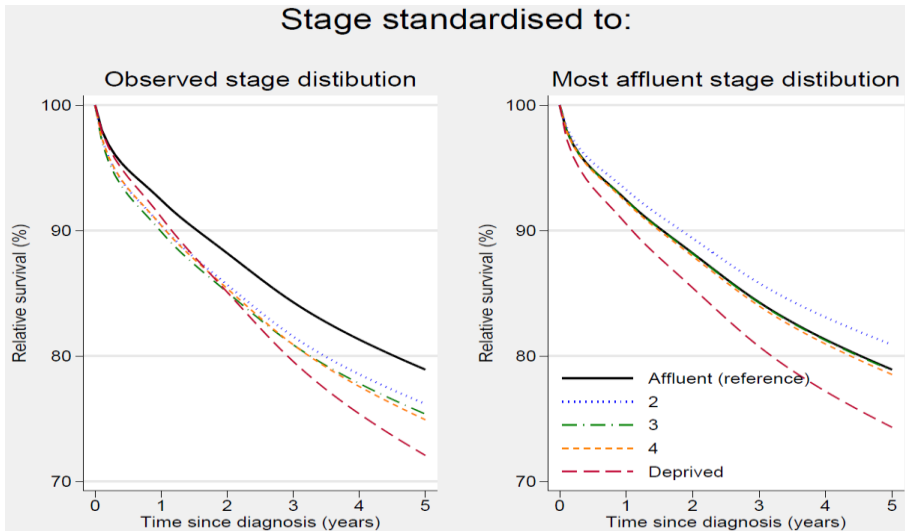
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Survival for breast cancer diagnosed at age 80-84 in the East of England 2006-2010

Stage standardised to:



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Avoidable deaths

- The two sets of stage-standardised survival estimates were combined with the appropriate values of the expected survival to estimate the number of avoidable deaths that would be observed if stage differences in deprivation groups could be eradicated (ie. matched to the most affluent group)

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Avoidable deaths (2)

Follow-up	Number of avoidable deaths by deprivation group (95 % CI)				Total avoidable deaths in the East of England
	Deprivation Group 2	Deprivation Group 3	Deprivation Group 4	Most Deprived (5)	
1 month	1.6 (1.3,1.9)	2.0 (1.7,2.4)	1.5 (1.2,1.9)	0.7 (0.5,0.8)	5.7 (4.8,6.6)
3 month	3.2 (2.8,3.7)	4.1 (3.6,4.7)	3.2 (2.7,3.7)	1.4 (1.1, 1.7)	12.0 (10.7,13.3)
6 month	4.5 (4.0,5.0)	5.7 (5.1,6.3)	4.7 (4.1,5.3)	2.1 (1.7,2.4)	17.0 (15.6,18.4)
1 year	6.1 (5.5,6.7)	7.4 (6.8,8.0)	6.7 (6.0,7.4)	3.1 (2.7,3.6)	23.3 (21.8,24.8)
3 year	8.1 (7.5,8.7)	9.2 (8.6,9.8)	9.6 (8.8,10.3)	4.7 (4.2,5.3)	31.6 (30.0,33.0)
5 year	10.2 (9.6,10.8)	10.4 (10.0,10.8)	11.8 (11.0,12.5)	6.8 (6.3,7.3)	39.2 (37.7,40.7)

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Avoidable deaths (3)

- Age- and deprivation- specific incidence of breast cancer for the whole of England was used to re-weight the estimates obtained from the East of England analyses.
- A typical yearly cohort size for female breast cancer in the whole of England was then used estimate the avoidable death values for England.

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Avoidable deaths (4)

Follow-up	Number of avoidable deaths by deprivation group				Total avoidable deaths in England
	Deprivation Group 2	Deprivation Group 3	Deprivation Group 4	Most Deprived (5)	
1 year	45.2	51.0	64.2	73.8	234.2
3 year	73.1	74.9	111.3	142.1	401.4
5 year	83.0	81.2	121.6	168.8	454.6

¹⁵ Stage at diagnosis and the deprivation gap in cancer survival



Conclusions

- Differences in stage at diagnosis are responsible for the near totality of survival differences for breast cancer in women in deprivation groups 3 and 4 when compared with more affluent women.
- However, differences in stage at diagnosis only explain about half of these survival differences for the most deprived group
 - Other factors, such as comorbidity and treatment use or quality, may account for some of the remaining differences, and this research question warrants further investigation.

¹⁶ Stage at diagnosis and the deprivation gap in cancer survival





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Acknowledgements

- The hospitals and pathology laboratories in the East of England
 - notably their Cancer Multi-Disciplinary Teams
- All the staff of the National Cancer Registration Service – Eastern Office
 - with particular thanks to Dr Clement Brown and Dr Brian Rous for stage assignment

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Further information

How much of the deprivation gap in cancer survival can be explained by variation in stage at diagnosis: an example from breast cancer in the East of England

MJ Rutherford¹, SR Hinchliffe¹, GA Abel², G Lyratzopoulos², PC Lambert^{1,3}, DC Greenberg^{2,4}.

¹University of Leicester, Department of Health Sciences, UK.

²Cambridge Centre for Health Services Research, Institute of Public Health, University of Cambridge, Cambridge.

³Medical Epidemiology and Biostatistics, Karolinska Institutet, Sweden.

⁴National Cancer Registration Service, Public Health England, Eastern Office, Cambridge, UK.

International Journal of Cancer. 18 Apr 2013.
doi: 10.1002/ijc.28221. [Epub ahead of print]

<http://onlinelibrary.wiley.com/doi/10.1002/ijc.28221/abstract>

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