

letter to the editor

Investigating changes over time in socioeconomic gaps in cancer survival: using differences in relative survival versus differences in excess mortality rates can give different answers

We read with interest the paper by Lyratzopoulos et al. [1], examining changing socioeconomic gaps in relative survival from breast and rectal cancer from 1973 to 2004 in England. They find widening inequalities in 5-year relative survival for rectal cancer and narrowing inequalities for breast cancer. They then interpret these trends in light of Victora's inverse equity hypothesis [2]; namely, bigger improvements in the efficacy of breast cancer treatment occurred in the 1970s than in the 1990s, meaning that deprived women's breast cancer survival caught up with non-deprived women in recent times as they too gained (albeit delayed) full access and benefit from the major innovations in the 1970s. Conversely, the big improvements in rectal cancer treatment have only occurred more recently, consistent with currently widening socioeconomic gaps in survival. We think this is a reasonable deduction and interpretation. However, we think the authors may have dismissed too lightly the issue of scale of measurement.

Lyratzopoulos et al. [1] chose to present 5-year relative survival ratios (RSRs) and interpret the absolute gap in relative survival between deprivation groups. They state that a similar interpretation was made if ratios of RSRs were used, rather than absolute gaps. However, survival is alternatively (and perhaps more coherently) thought of as a result of mortality rates—or excess mortality rates (akin to hazard ratios) in case of relative

survival methodologies [3]. Table 1 shows what the excess mortality rates would have been to produce the RSRs shown by Lyratzopoulos et al. [1], assuming that they were constant over the 5 years, and using the formula $-\ln([\text{RSR}]/100)/5$. In contrast to a narrowing of the absolute gap in relative survival between deprived and non-deprived over time for breast cancer, one sees a widening in the ratio of excess mortality rates over time. (For rectal cancer, the rate ratio increases over time, just as does the absolute gap in relative survival.)

The reason for this different conclusion for breast cancer when using excess mortality rates, and their ratios, is that survival is bound between 0 and 1.0. Consider a constant excess mortality rate ratio of 1.5 comparing deprived and non-deprived. When the non-deprived group's excess mortality rate is 0.03 per person per year, the five RSRs are 0.86 and 0.80 for non-deprived and deprived, respectively, a gap of 0.06. However, when the non-deprived group's excess mortality rate is 0.10 per person per year, the five RSRs are 0.61 and 0.47, a wider gap in RSRs of 0.13 (using non-rounded data). That is, the patterns in gaps between RSRs (be it on an absolute or relative scale) and the patterns in gaps in excess mortality rates vary notably with background variation in the average or reference groups excess mortality rate.

We suggest that not only do absolute and relative gaps in relative survival need presenting in inequality analyses for cancer survival but so too do the gaps in excess mortality rates.

T. Blakely*, M. Soeberg & D. Sarfati

Department of Public Health, University of Otago, Wellington, New Zealand

(*E-mail: tony.blakely@otago.ac.nz)

disclosure

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Table 1. Relative survival ratios and estimated excess mortality rates for breast and rectal cancer patients, England and Wales, 1973–2004.

	Relative survival ratio				Equivalent annual excess mortality rate			
	Deprived patients	Non-deprived patients	Absolute gap	Relative gap	Deprived patients	Non-deprived patients	Absolute gap (rate difference)	Relative gap (rate ratio)
Breast cancer								
1973	50	60	–10	0.83	0.139	0.102	0.036	1.36
2004	80	86.5	–6.5	0.92	0.045	0.029	0.016	1.54
Rectal cancer								
1973	27	33	–6	0.82	0.262	0.222	0.040	1.18
2004	47	59	–12	0.80	0.151	0.106	0.045	1.43

references

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