An International Comparison of Cancer Survival: Advantage of Toronto's Poor Over the Near Poor of Detroit

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A recent study of cancer survival in Toronto and Detroit compared their ecologically defined poor and found advantaged survival among Canadians for 13 of 15 cancer sites.¹ Moreover, the pooled Toronto/Detroit five-year survival rate ratio was quite large (1.64; 95% CI 1.56,1.72) among the poorest third of their neighbourhoods. The only other Canada-US comparative study in this field found their cancer survival experience to be substantively similar.² Its essentially non-significant findings are not surprising, however, as it did not provide any measure of control for socioeconomic status (SES); it merely compared cohorts across all aggregated SES levels. Even our more recent study, by comparing samples of both countries' poor as defined by their lowest income tertiles, only provided rather gross SES adjustment. The median income among the poorest population tertiles was significantly greater in Toronto than in Detroit.³ The present analysis systematical-

ly replicates the between-country cancer survival comparison with a more precise quintile-based SES adjustment.

METHODS

The five-year cancer survival experience of adult incident cancer cases arising in the metropolitan areas of greater Toronto, Ontario (Ontario Cancer Registry) and Detroit, Michigan (Surveillance, Epidemiology and End Results [SEER]) from 1986 to 1988 were followed until December 1993.⁴ As did the original, the present analysis used a census-based SES measure (census tract proportion meeting a 'low income' criterion in Canada and 'poverty' threshold in the US), but it then defined relative income quintiles, rather than tertiles.^{5,6} Its critical comparison is between Toronto's poor (lowest income quintile, median US dollars = \$28,000 annually) and Detroit's near poor (second lowest quintile, median = \$26,300). Because the original study implicated more equitable access to preventive and therapeutic health care services as a primary explanation for its observed Canadian survival advantage, this analysis focused on those cancer sites which may be most affected by such access (early detection is possible and is probably associated with treatment efficacy): breast, prostate, colon, rectum, bladder, oral, and cervix uteri. The Ontario Cancer Registry has been estimated to ascertain more than 95% of the cancers which arise in the Province, a finding which compares favourably with the SEER-based Detroit registration rate.⁷ This

study's specific metropolitan data sets were also found to be nearly identical on other data quality indicators: Toronto—89% microscopically confirmed and 2% enumerated on the basis of death certificate only; Detroit—91% and 1%, respectively.

Cumulative observed survival rates were corrected for competing causes of death by excluding such outcome events. Only deaths due to cancer were defined as valid outcomes; deaths from other causes were considered censored events.^{8,9} Survival rates were directly age-adjusted using this study's combined Toronto-Detroit population of cases by each specific cancer site across the following age categories: 25-44, 45-54, 55-64, 65-74, 75 years of age or older. Confidence intervals (95%) around survival rate ratios were Mantel-Haenszel chi-square test-based.^{10,11}

RESULTS

The comparison of Toronto and Detroit on five-year cancer survival among the poorest or lowest income fifth of their respective populations, is displayed in Table I (left column). All of the survival rate ratios (SRR) were in the predicted direction of Canadian advantage, and all were statistically significant except the rectal cancer comparison. Significant SRR point-estimates ranged from 1.24 to 1.82; the pooled SRR was 1.39 (95% CI; 1.32,1.46). However, these essentially neighbourhood comparisons, which we believe are themselves of great public health importance, may still be confounded by household income status. The people

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TABLE I
Metropolitan Toronto Versus Detroit Five-Year
Cancer Survival in Low Income Areas

Cancer Site	n ^a	Toronto's Poorest vs. Detroit's Poorest Quintile			n	Toronto's Poorest vs. Detroit's 2nd Poorest Quintile		
		SR ^b	SRR ^c	(95% CI) ^d		SR	SRR	(95% CI)
Breast ^e								
Detroit	831	.512	1.00 ^f		935	.568	1.00	
Toronto	854	.685	1.34	(1.24,1.45)	854	.685	1.21	(1.11,1.32)
Prostate								
Detroit	885	.407	1.00		744	.478	1.00	
Toronto	453	.565	1.39	(1.21,1.59)	453	.565	1.18	(1.00,1.40)
Colon								
Detroit, Female	369	.327	1.00		374	.414	1.00	
Toronto, Female	299	.475	1.45	(1.16,1.82)	299	.475	1.15	(0.98,1.35)
Detroit, Male	319	.358	1.00		289	.368	1.00	
Toronto, Male	299	.443	1.24	(1.11,1.39)	299	.443	1.20	(1.04,1.38)
Rectum								
Detroit, Female	99	.364	1.00		142	.444	1.00	
Toronto, Female	102	.436	1.20	(0.88,1.63)	102	.436	0.98	(0.91,1.06)
Detroit, Male	139	.371	1.00		147	.408	1.00	
Toronto, Male	149	.432	1.16	(0.86,1.57)	149	.432	1.06	(0.90,1.24)
Bladder								
Detroit, Female	83	.356	1.00		82	.442	1.00	
Toronto, Female	93	.570	1.60	(1.14,2.24)	93	.570	1.30	(0.98,1.73)
Detroit, Male	162	.433	1.00		182	.522	1.00	
Toronto, Male	233	.590	1.36	(1.16,1.60)	233	.590	1.13	(1.00,1.28)
Oral								
Detroit, Female	90	.357	1.00		74	.431	1.00	
Toronto, Female	69	.557	1.56	(1.00,2.44)	69	.557	1.29	(0.95,1.75)
Detroit, Male	222	.241	1.00		160	.318	1.00	
Toronto, Male	156	.438	1.82	(1.33,2.48)	156	.438	1.38	(1.05,1.81)
Cervix Uteri ^g								
Detroit	510	.425	1.00		424	.498	1.00	
Toronto	121	.586	1.38	(1.09,1.75)	121	.586	1.18	(0.92,1.52)

a Number of cumulative incident cancer cases

b Cumulative survival rate

c Survival rate ratio

d Confidence interval

e Female

f Baseline

g Invasive

living in Detroit's lowest income quintile (median = \$12,600) had substantially lower incomes than their counterparts in Toronto (median = \$28,000). This study's critical comparison between Toronto's poorest income quintile and Detroit's second poorest quintile adjusted for such disparity (Table I, right column). Again, though attenuated somewhat, all of the SRR point-estimates, except for rectal cancer, were in the predicted direction, and they were all significant or approached significance; the pooled SRR was 1.20 (95% CI; 1.16,1.24). No significant differences were observed among Toronto's and Detroit's middle or highest income quintiles.

DISCUSSION

This study found a significant Canadian survival advantage for six of seven common cancers among Toronto's and Detroit's lowest income areas. Even after ecological adjustment for between-country income

disparity, approximately 20% more Canadians survived a minimum of five years after being diagnosed with one of the more common detectable and treatable cancers. The ecological fallacy notwithstanding, we believe it is important simply to know that where people with cancer live seems to be highly associated with how long they live in Detroit, but not in Toronto. This study's policy implications are probably most relevant to the relatively poor, as the two countries' samples did not differ significantly on cancer survival in their middle or relatively high income areas.

This study's contextual inferences are perhaps most relevant to understanding community-level phenomena such as systemic environmental factors which may differ between the two countries. Their different health care systems is one such cogent factor which fits with this study's findings as well as others.¹²⁻¹⁸ There is little accumulated evidence to suggest that behavioural (personal or tumour-related)

factors could explain such consistent between-country survival differences across different cancers. On the other hand, this study's findings are consistent with previous ones which have found access to health care as operationalized by payer (single versus multiple or none) to be associated with the prevention, investigation and treatment of a variety of diseases.

In addition to their systemic health care difference, Toronto and Detroit differ in another obvious and, as for the present analysis, potentially confounding way; recent censuses found that many more blacks live in Detroit's second lowest income quintile area (44%) than do in Toronto's lowest (6%). Ecological adjustment—selection of a Detroit low income area with greatly diminished black representation (5%, second lowest black quintile of the second lowest income quintile)—was necessitated because the Ontario Cancer Registry does not routinely code racial group status. It did not result in any practical alteration of findings.

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