Primary Care and Health Inequality: Natural Experiment Comparing England and Ontario

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BACKGROUND & OBJECTIVES

Persistent or rising socioeconomic inequalities in health outcomes are consistently observed in high income settings

England implemented equity-oriented primary care reforms during the mid to late 2000s, specifically targeting health inequalities. Improvements in mortality amenable to healthcare have been observed, but with no control/comparison group, improvements could be secular trends not related to the reforms.

Aim: to quantify the impact of equity-oriented primary care reform on reducing health inequalities from 2004-2011 by comparing inequality trends in England relative to Ontario, Canada (where primary care reforms occurred but were not equity-oriented)

DATA SOURCES & STUDY POPULATION

England data sources included:
- National Health Service (NHS) General and Personal Medical Services workforce census; Office for National Statistics (ONS) mortality data and mid-year population estimates

Ontario data sources included:
- Registered Persons Database (RPDB); ICES Physician Database (IPDB); Office of the Registrar General (ORGD) mortality data

Whole-population data from 2004-2011 were aggregated into small area geographical units from which we could measure SES:

Socio-Economic Status (SES):
- England – measured using 2010 Index of Multiple Deprivation
- Ontario – measured using 2006 Ontario Marginalization Index

Geographical units were aggregated into equally-sized decile groups for analysis based on SES and ranked from 1 (most affluent areas) to 10 (most deprived areas). Mid-year population estimates were derived for each decile.

MEASURES & ANALYSES

Outcome Indicators:
- **Primary care supply** (NHS, IPDB): population per full-time equivalent primary care physician
- **Mortality amenable to healthcare** (ONS, ORGD): deaths from causes considered avoidable with medical intervention

Inequality Measures:
- **Slope Index of Inequality (SII)**: absolute difference in outcome between most and least deprived SES deciles
- **Relative Index of Inequality (RII)**: proportionate gap between most and least deprived SES deciles, relative to the mean

Statistical Analyses:
- **Difference-in-Differences (DID)** in inequality (outcome): model includes independent dichotomous variables for
  - Jurisdiction (β_1): England vs Ontario
  - Time Period (β_2): 2004-2006 vs 2007-2011
  - A two-way interaction (β_3): the DID estimator

RESULTS

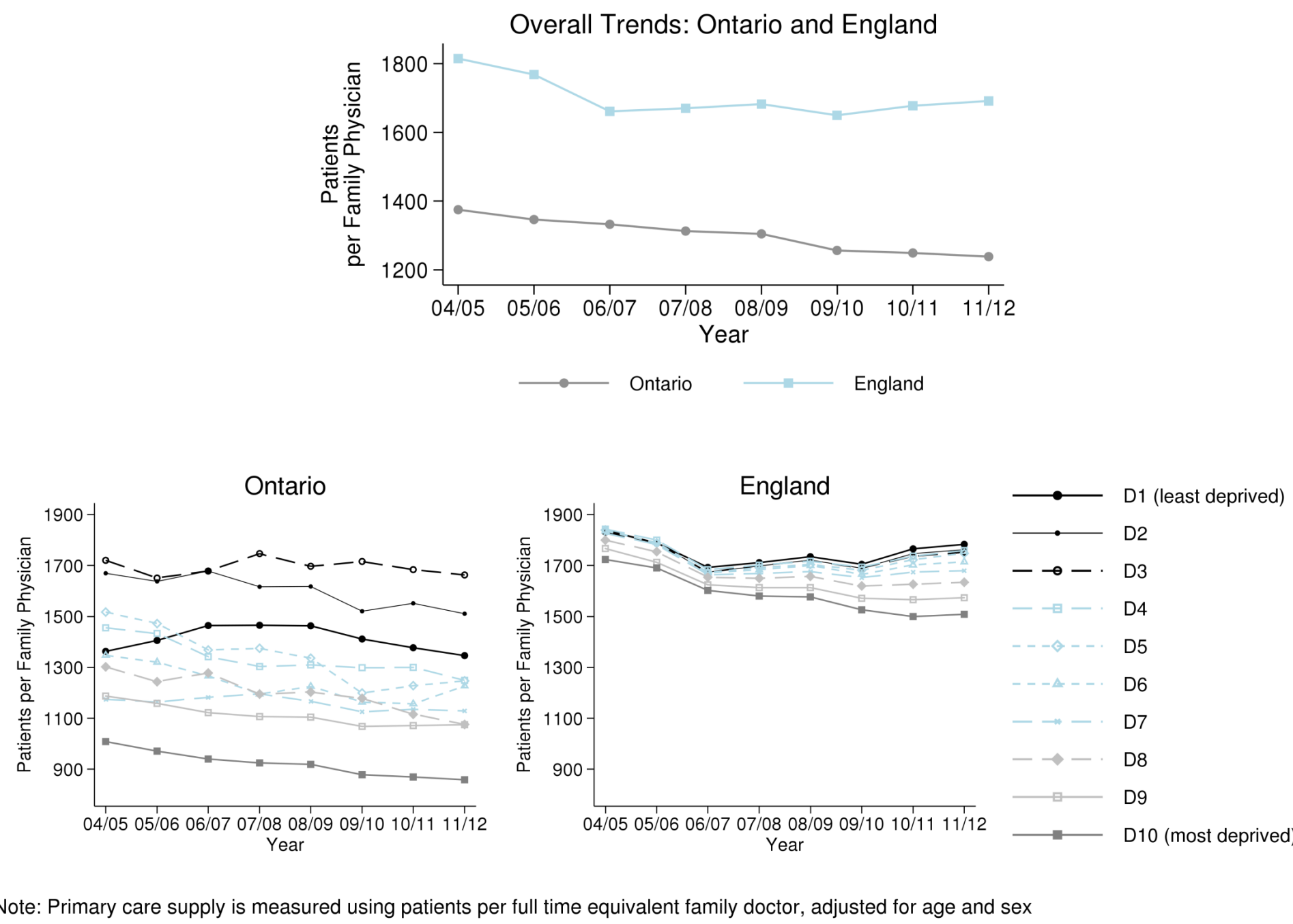**Figure 1: Physician supply increased more in deprived areas in England than in Ontario, 2004-2011**

*Note: Primary care supply is measured using patients per full time equivalent family doctor, adjusted for age and sex

Figure 2: Gap in amenable mortality by deprivation decreased more in England than in Ontario, 2004-2011

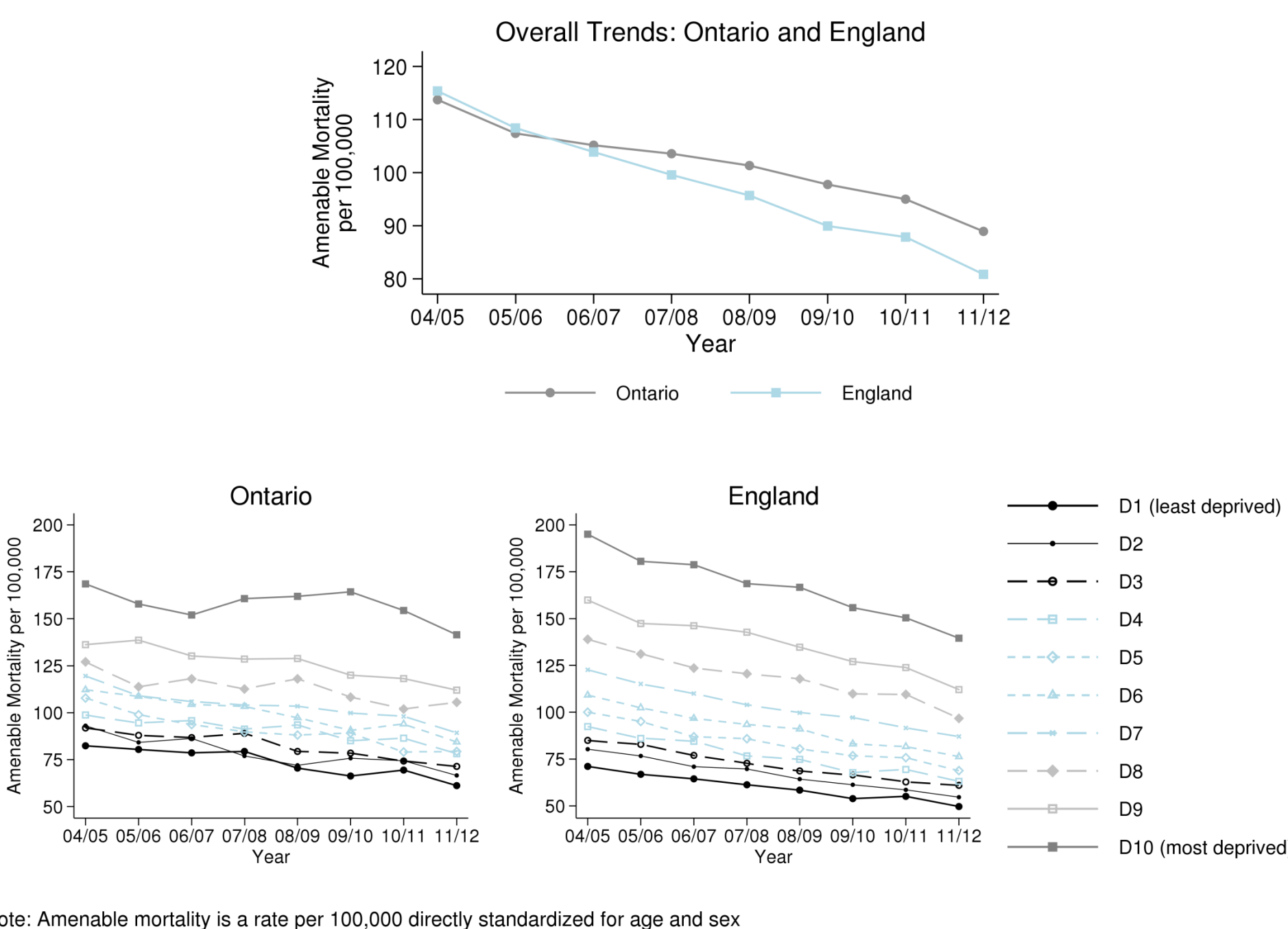*Note: Amenable mortality is a rate per 100,000 directly standardized for age and sex

Figure 3: Absolute (SII) and relative (RII) inequalities in amenable mortality decreased more in England than in Ontario, 2004-2011
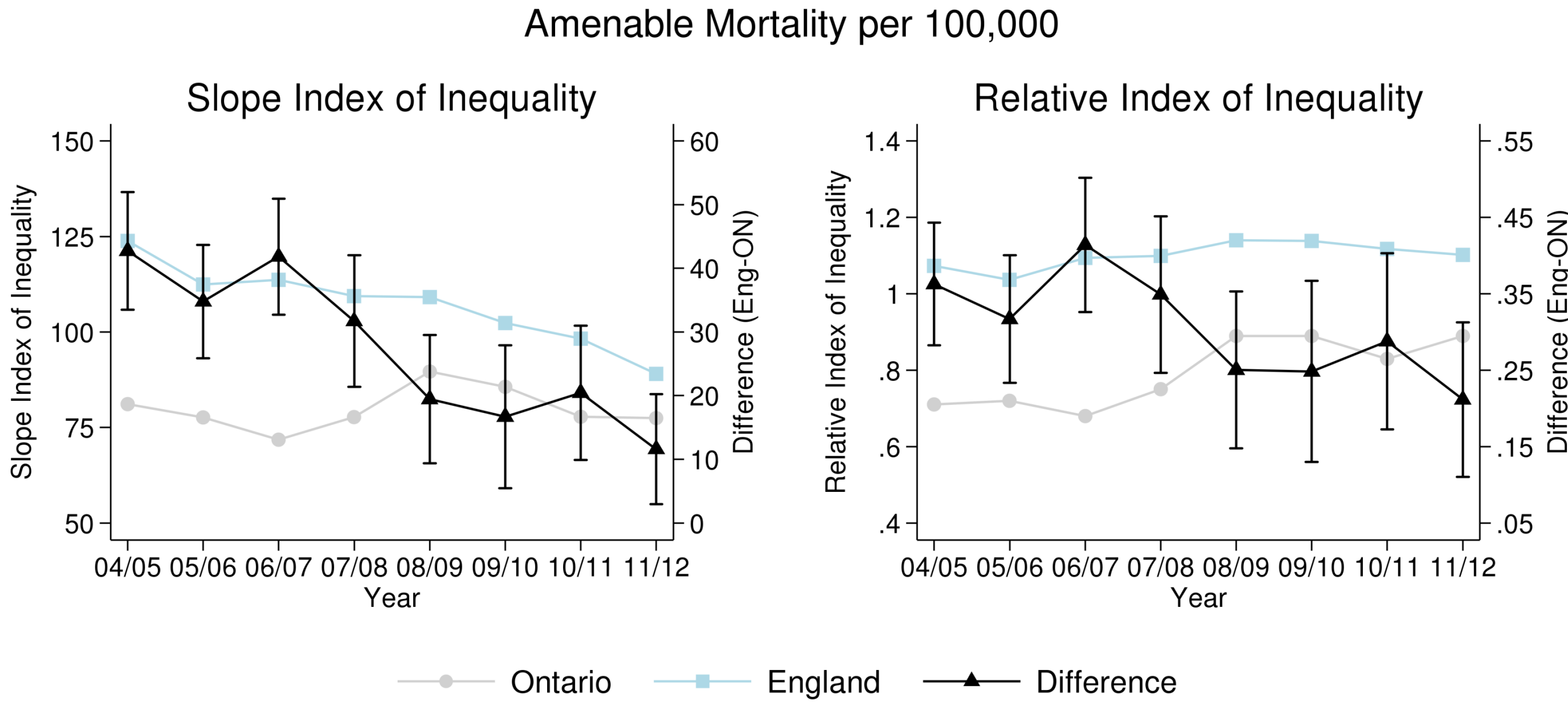
Amenable Mortality per 100,000

Table 1: Difference-in-differences analyses show absolute (SII) and relative (RII) inequalities in amenable mortality decreased more in England than in Ontario (2004-6 vs. 2007-11)

	Overall Mean	D01 (Least Deprived SES Decile)	D10 (Most Deprived SES Decile)	Slope index of Inequality (SII)	Relative Index of Inequality (RII)
Ontario 2004-6	108.8 (99.9, 117.6)	80.5 (75.8, 85.2)	159.5 (138.7, 180.2)	76.8 (65.2, 88.5)	0.70 (0.65, 0.76)
England 2004-6	109.2 (95.8, 122.7)	67.5 (59.1, 75.9)	184.8 (162.6, 207.0)	116.6 (101.1, 132.2)	1.07 (1.00-1.14)
[1] Difference	0.5 (-15.3, 16.2)	-13.0 (-19.2, -6.8)	25.3 (5.7, 44.9)	39.9 (27.4, 52.4)	0.36 (0.31, 0.42)
Ontario 2007-11	97.3 (89.9, 104.7)	69.3 (61.0, 77.7)	156.6 (145.2, 168.0)	81.7 (74.7, 88.7)	0.85 (0.77, 0.93)
England 2007-11	90.8 (81.8, 99.8)	55.7 (50.2, 61.2)	156.3 (141.3, 171.2)	101.6 (91.1, 112.1)	1.12 (1.10, 1.14)
[1] Difference	-6.5 (-18.0, 5.0)	-13.7 (-22.0, -5.4)	-0.3 (-15.9, 15.3)	20.0 (9.5, 30.5)	0.27 (0.20, 0.34)
[2] Difference-in-Differences	-7.0 (-26.1, 12.1)	-0.7 (-11.7, 10.4)	-25.6 (-48.3, -3.0)*	-19.8 (-34.9, -4.8)*	-0.10 (-0.19, -0.01)*

[1] Difference value = England – Ontario, for that time period
[2] Difference-in-Differences Estimator = (England[2007-11] - England[2004-6]) - (Ontario[2007-11] - Ontario[2004-6])
* Denotes statistically significant difference (p<0.05)

KEY FINDINGS

More deprived areas tended to have fewer patients per family physician (Fig 1)
- Reflects "fair" inequality – greater burden of illness and primary care workload in deprived communities
- England – inequality widened, with primary care reforms
- Ontario – not monotonic, wide variability across SES groups

Mortality amenable to healthcare fell more rapidly in deprived groups in England than in Ontario in the post-2006 period (Fig 2)
- England – annually, 7.5 fewer deaths per 100,000, *p<0.05*
- Ontario – annually, 4.6 fewer deaths per 100,000, *p=0.112*
- In both areas, overall, amenable mortality trended downwards

Large 'pro-poor' improvements in inequalities of amenable mortality from 2007 onwards (vs 2004-2006) were observed in England than in Ontario (Fig 3)
- Inequality was greater in England than in Ontario throughout study period
- Post-2006 reduction in SII observed in England
- Absolute Inequality (SII), DID = -19.8 (-34.9 to -4.8), *p<0.05*
- Relative Inequality (RII), DID = -0.10 (-0.19 to -0.01), *p<0.05*

IMPLICATIONS

The divergent trends in mortality amenable to healthcare between England and Ontario from 2007 to 2011 suggest that without sustained policy action in England, absolute inequality gaps would not have fallen and relative gaps would have increased more rapidly. We therefore conclude that equity-oriented investment in primary care may have a modest role in helping to reduce SES inequalities in health, or at least in helping to ameliorate growing health inequalities.

Where reducing health inequality is a priority for the healthcare system, assessing inequities as part of health system performance monitoring and using this information to guide policy implementation seems worthwhile.

The main limitation of this study is its reliance on the assumption that Ontario is a useful counterfactual of what would have occurred in England in the absence of equity-oriented primary care reforms

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