

# Ontario is Decreasing Avoidable Mortality Rates but not in its Marginalized Neighborhoods

Presented by:  
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# DISCLOSURES

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- ▶ **Potential for conflicts of interest:** None
- ▶ **Relationships with financial sponsors:**
  - **Grants:** Bruyère Research Institute
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  - **Speakers Bureau/Honoraria:** None
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  - **Patents:** None
  - **Other:** None

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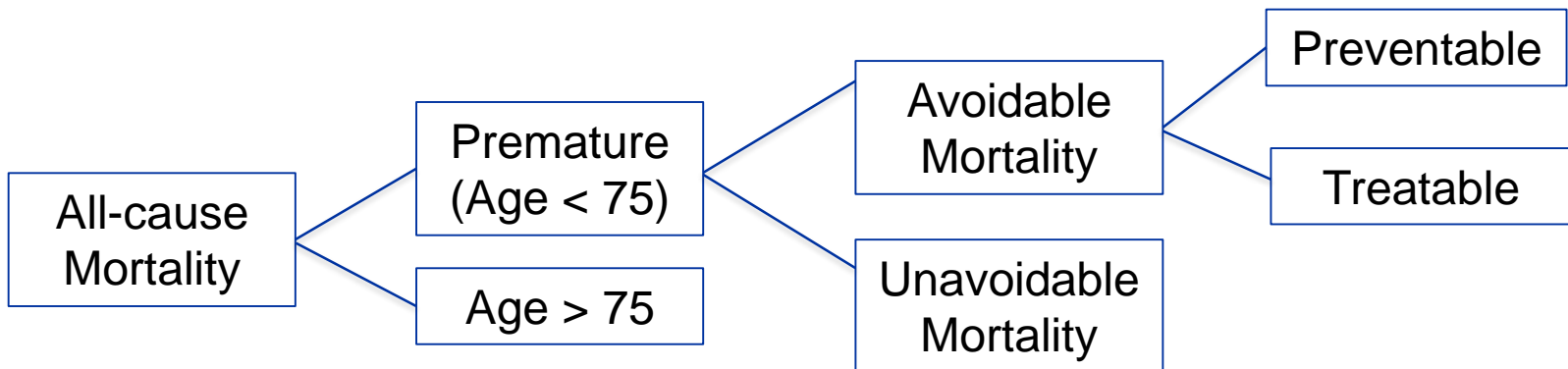


# INTRODUCTION

## ▶ Avoidable Mortality (AM)

- *Preventable causes*: drownings, colorectal cancer, COPD
- *Treatable causes*: tuberculosis, hypertension, meningitis

## ▶ ↓ AM rates largely due to advances in medical treatment



# OBJECTIVE

- ▶ To examine how changes in neighborhood-level marginalization impact Avoidable Mortality rates in Ontario



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# METHODS

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## ► Exposure: Ontario Marginalization Index

- Four Dimensions
  - **Ethnic concentration:** recent immigration, visible minorities
  - **Dependency:** workforce eligibility, dependency ratio
  - **Material deprivation:** income, education
  - **Residential instability:** home ownership, relationship status
- Dimensions stratified into quintiles (Q5 = most marginalized)

## ► Outcome: Avoidable Mortality

- CIHI definition based on standard ICD-9 and ICD-10 codes



## METHODS

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- ▶ **Setting:** Ontario, Canada
- ▶ **Participants:** all avoidable deaths between 1993 and 2014 (N = 490,006)
- ▶ **Databases:** Death Registry, Ontario Health Insurance Plan (OHIP), Registered Persons
- ▶ **Exclusions:** no ON-Marg index, no cause of death, no health care number, no postal code (N = 26,991)
- ▶ **Final study size:** 463,015



# ANALYSES

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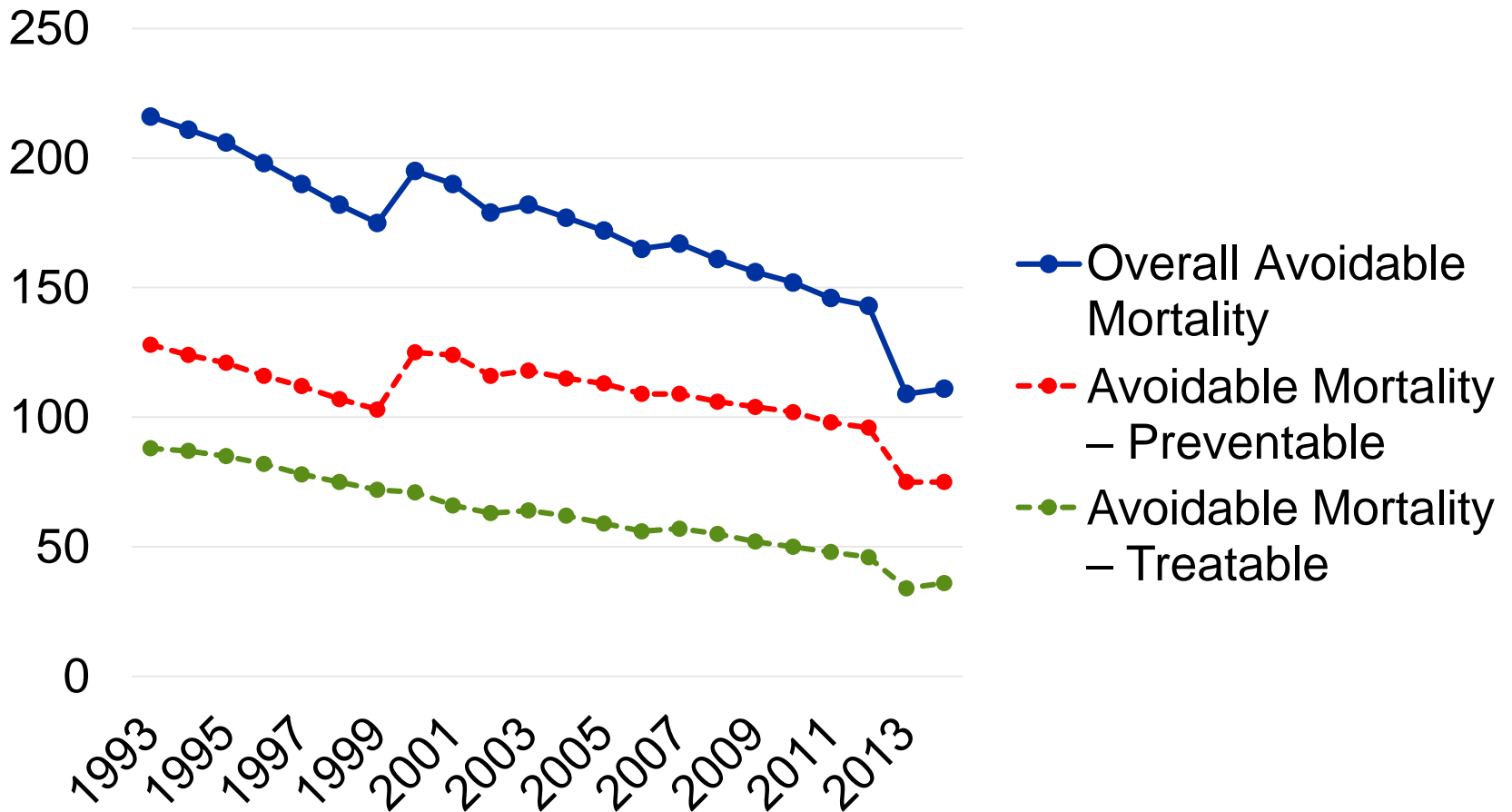
## ▶ 1. Annual age-sex standardized AM rates

- Overall and stratified by preventable and treatable causes
- Calculated for each marginalization dimension

## ▶ 2. Marginalization trends

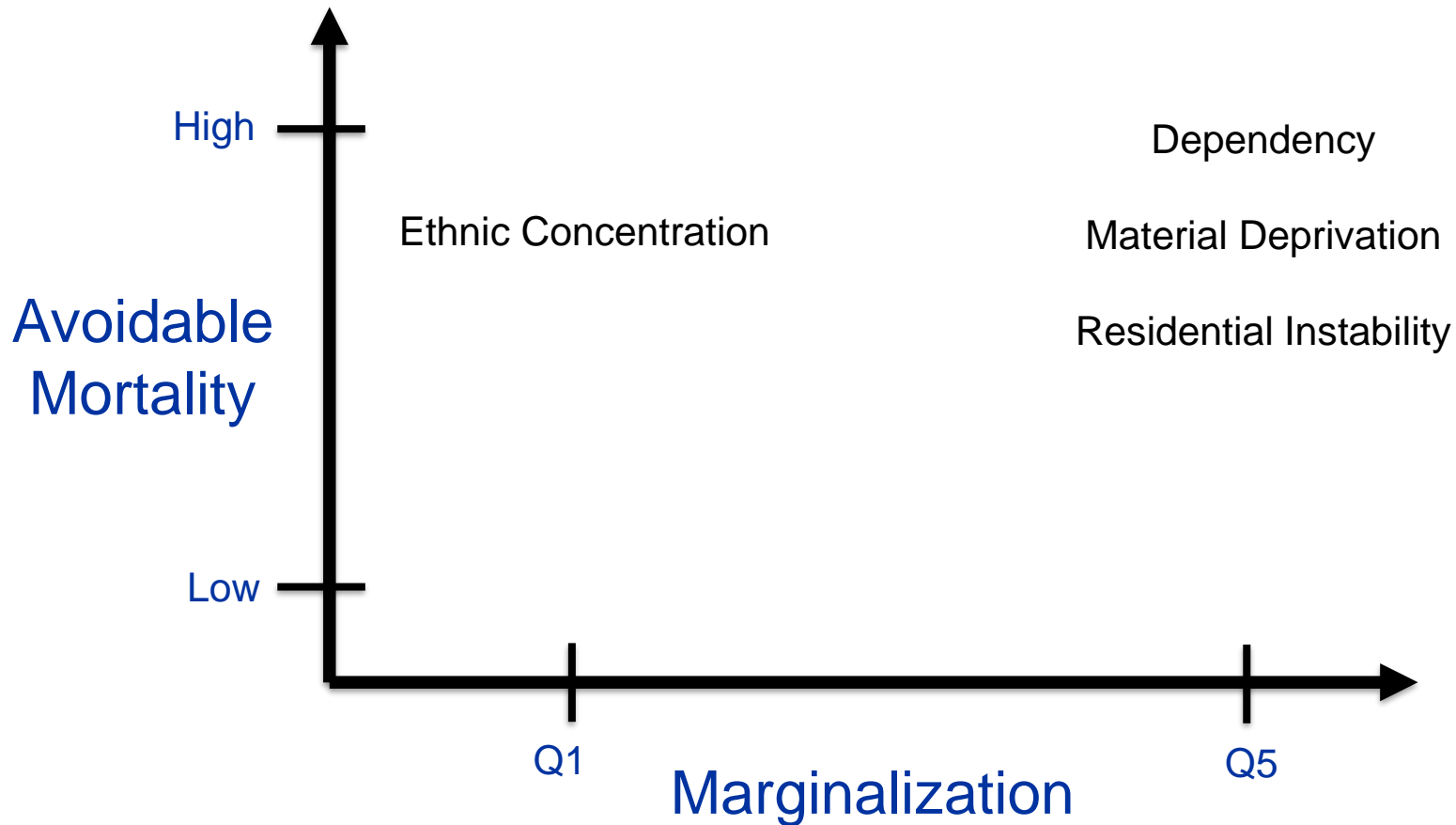
- Annual Avoidable Mortality rate ratio between most marginalized (Q5) and least marginalized (Q1) for each dimension
- E.g. for Material deprivation:  $AM_{Q5}$  rate /  $AM_{Q1}$  rate in 2014

## Age-sex standardized annual AM rates per 100,000 population

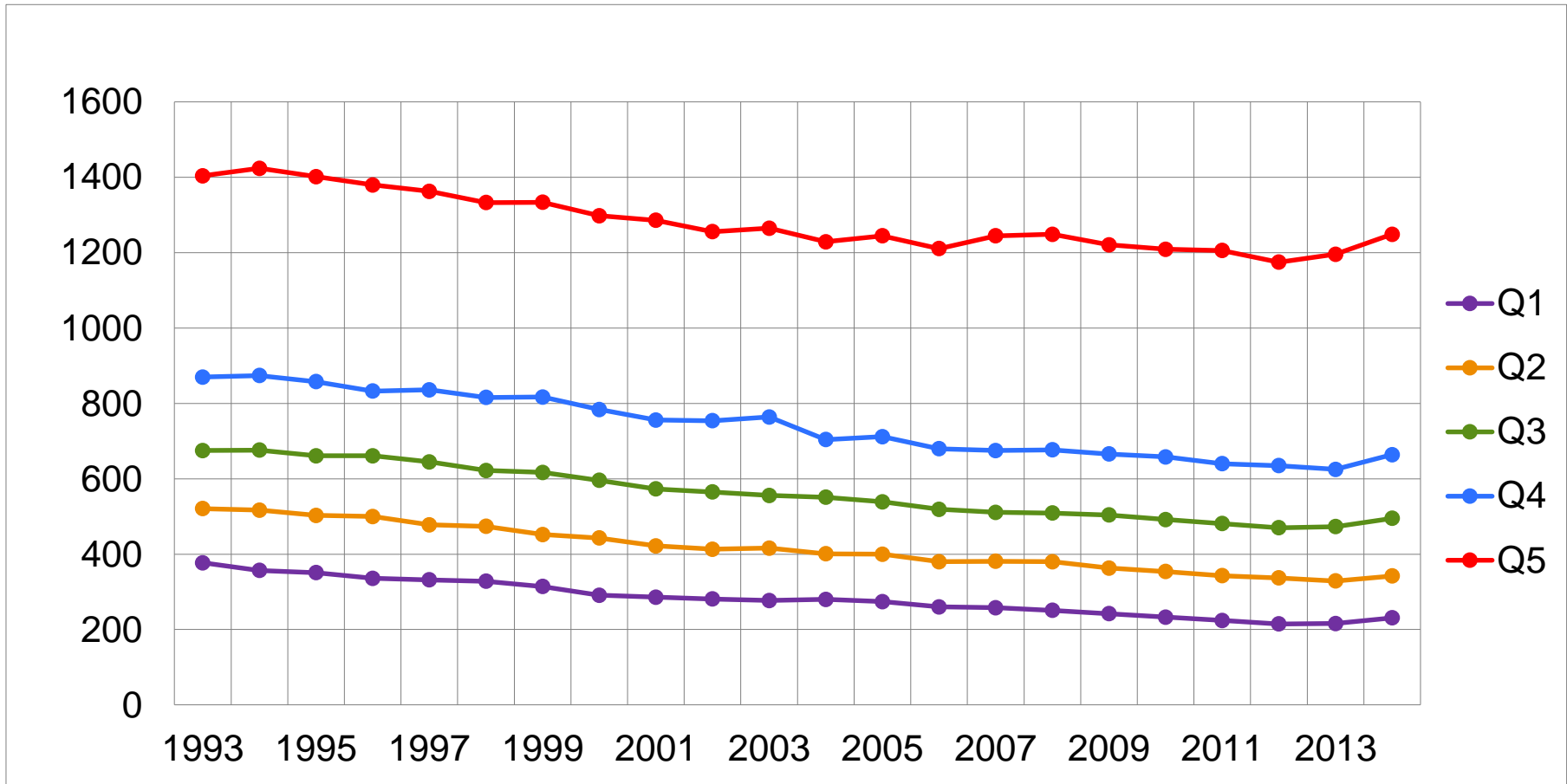




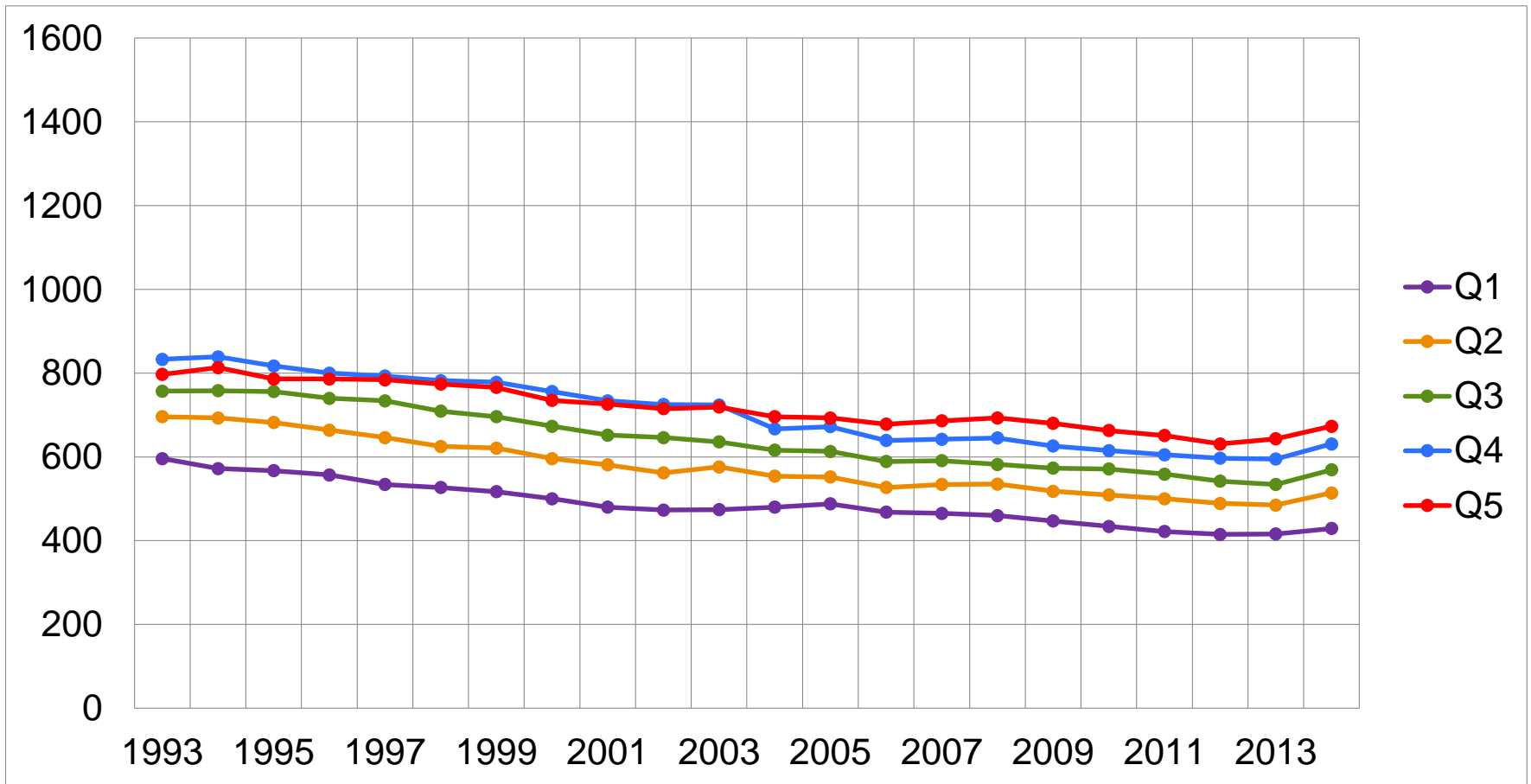
# Annual AM rates by marginalization dimension



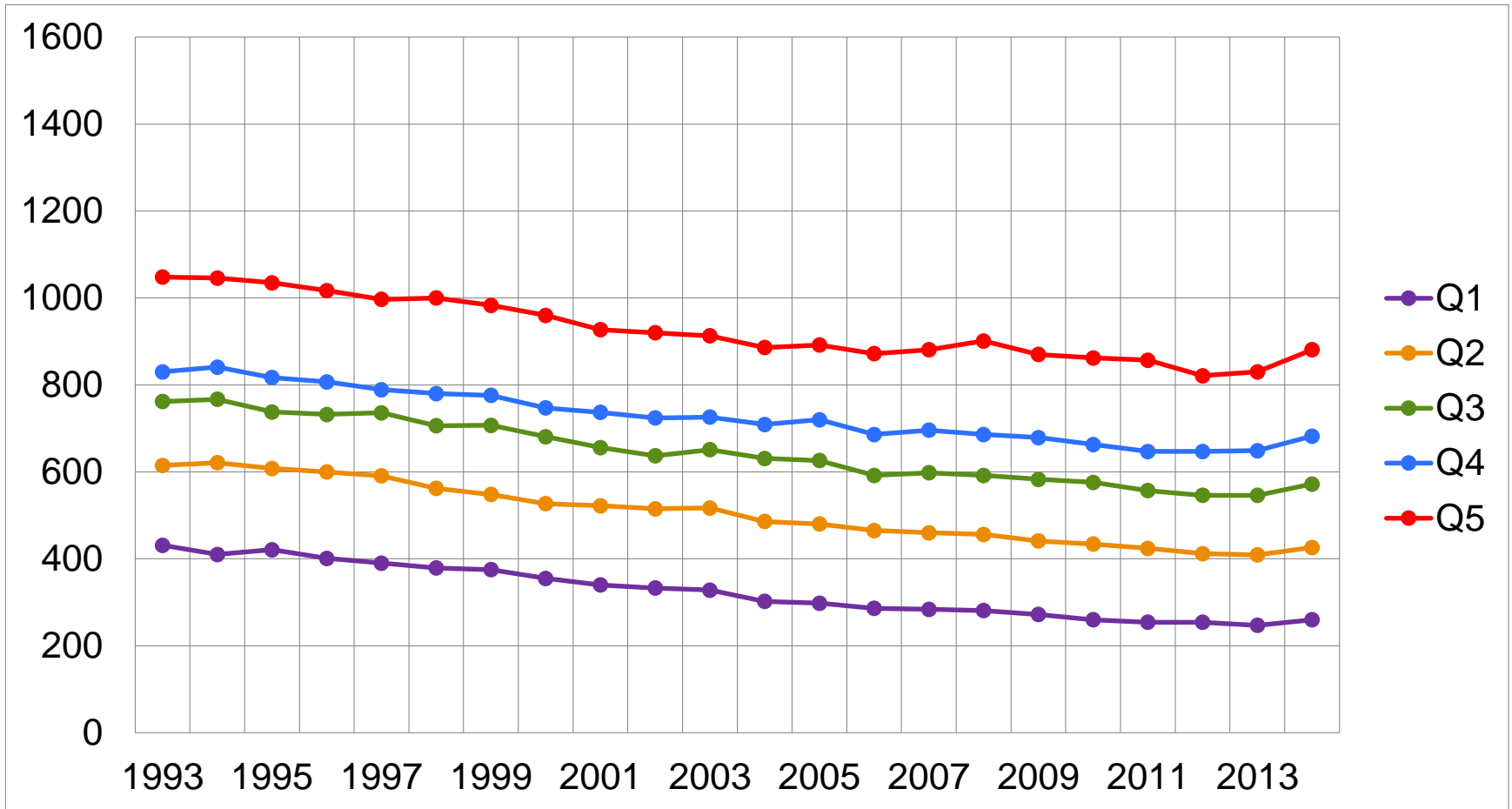
# Dependency: Annual age-sex standardized AM rates by quintile



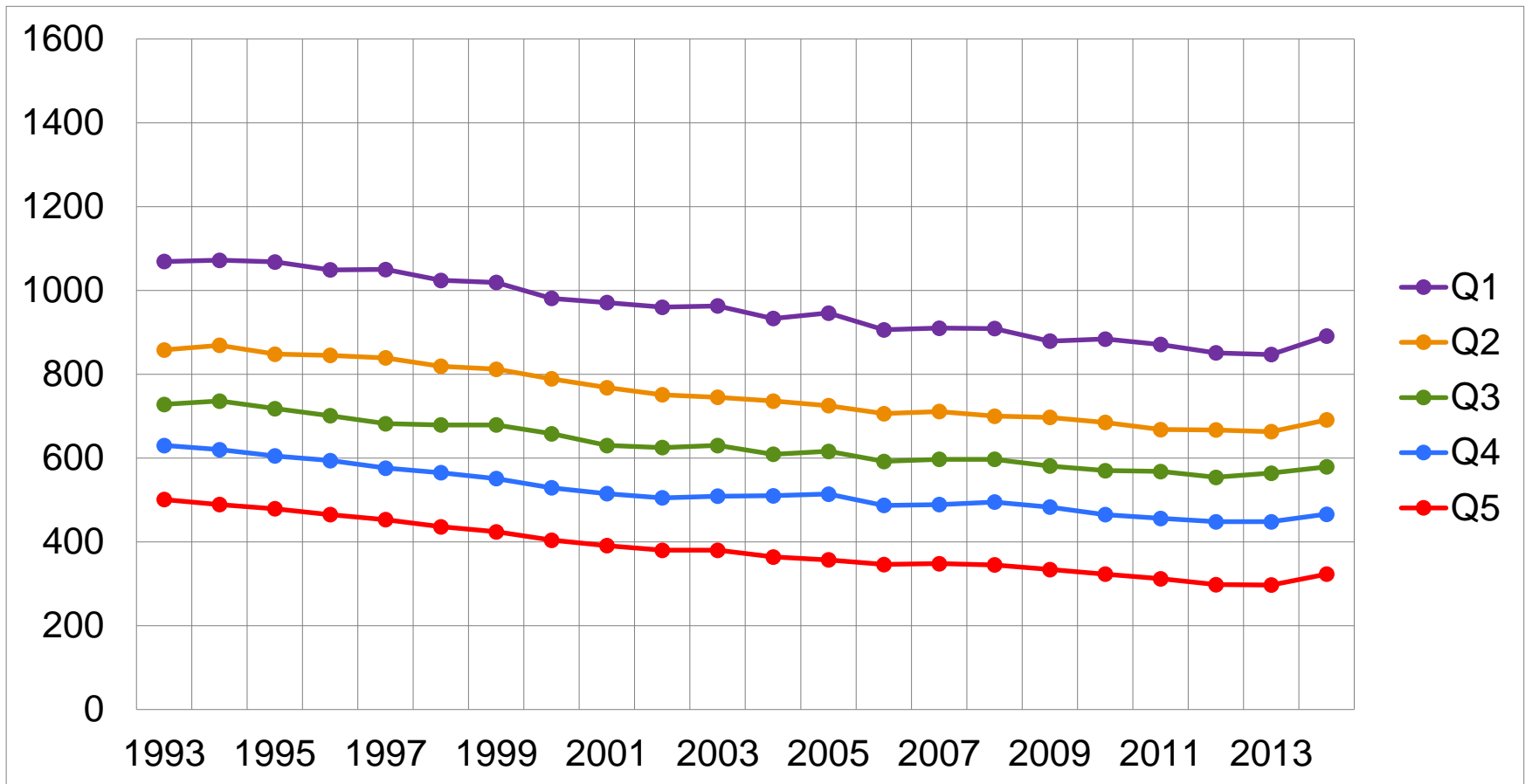
## Material Deprivation: Annual age-sex standardized AM rates by quintile



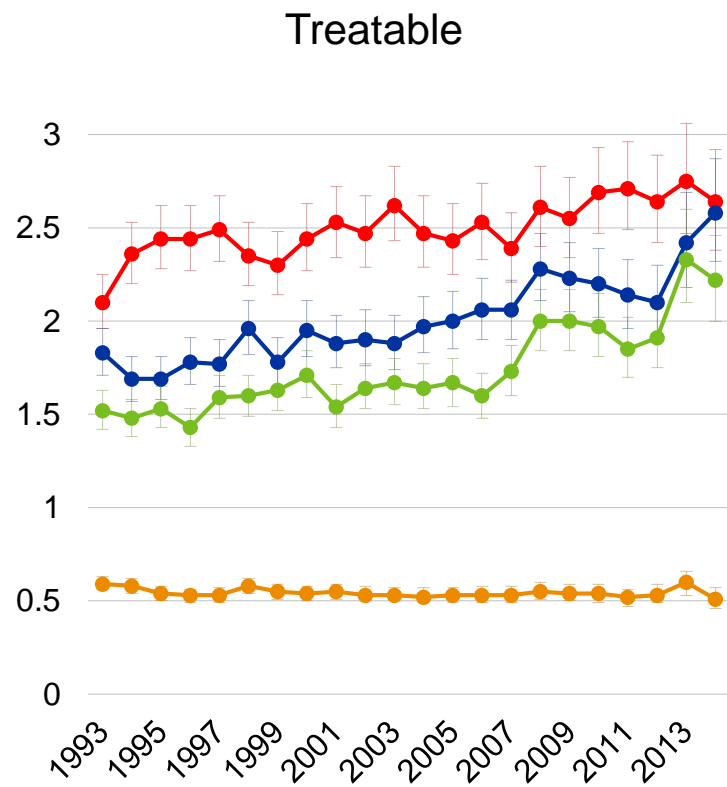
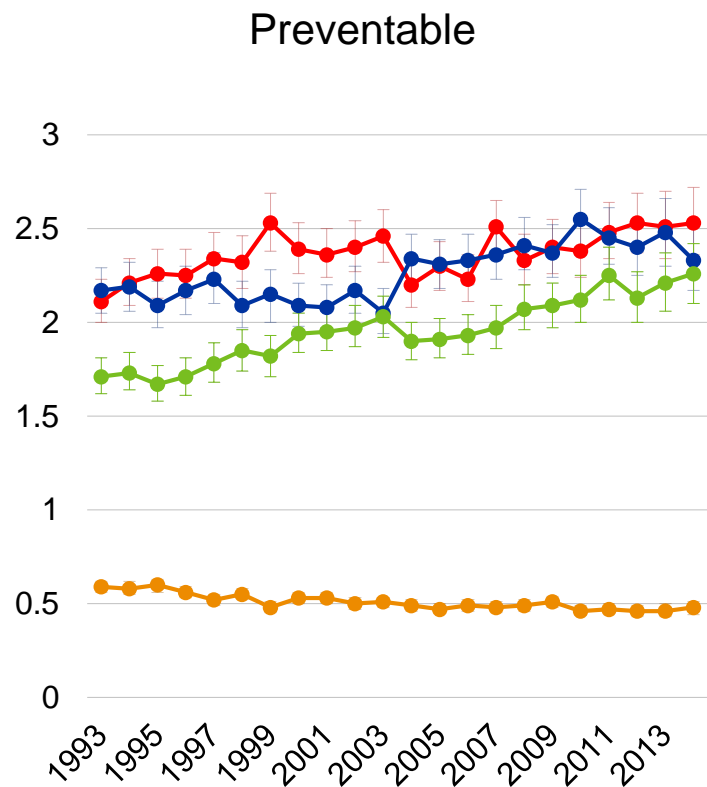
## Residential Instability: Annual age-sex standardized AM rates by quintile



## Ethnic Concentration: Annual age-sex standardized AM rates by quintile



# Marginalization Trends: Annual Q5/Q1 AM rate ratios by dimension



- Dependency
- Residential Instability
- Material Deprivation
- Ethnic Concentration



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## DISCUSSION

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- ▶ Marginalized neighbourhoods are increasingly disadvantaged in ↓ AM rates
- ▶ Marginalized neighbourhoods may not have seen full benefit from advances in medical treatment
- ▶ Benefits for ethnically concentrated neighbourhoods may be due to healthy immigrant effect



# DISCUSSION

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## ► Strengths

- Robust databases and variable definitions
- Multiple dimensions of marginalization to examine AM trends over time

## ► Limitations

- Change from ICD-9 to ICD-10 codes in 2000
- Changes to classification of cause of death in 2013
- Census data may underestimate some types of marginalization (e.g. First Nations living on reserves)



## CONCLUSION

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- ▶ Neighbourhoods with the highest levels of dependency, material deprivation, and residential instability consistently have the highest AM rates
- ▶ Despite ↓ AM rates, the gap between the most and least marginalized neighbourhoods is increasing



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# ONTARIO MARGINALIZATION INDEX

- ▶ **Dependency:** proportion of the population aged 65+, dependency ratio (total population 0-14 and 65+/total population 15 to 64), proportion of the population aged 15+ not participating in labor force
- ▶ **Ethnic Concentration:** proportion of the population who are recent immigrants and proportion of the population who self-identify as a visible minority
- ▶ **Material Deprivation:** proportion of the population aged 20+ without a high school diploma, proportion of families who are lone parent families, proportion of the population receiving government transfer payments, proportion of the population aged 15+ who are unemployed, proportion of the population considered low income, proportion of households living in dwellings that are in need of major repair
- ▶ **Residential Instability:** proportion living alone, proportion of population who are not youth (aged 16+), average number of persons per dwelling, proportion of dwellings that are apartment buildings, proportion of the population who are single/divorced/widowed, proportion of dwellings that are not owned, proportion of the population who moved during the past 5 years



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# DEMOGRAPHICS

Variable	Avoidable Mortality Preventable	Avoidable Mortality Treatable
<b>Total population</b>	N=294,799	N=168,216
<b>Mean age ± SD</b>	59.98 ± 12.91	61.53 ± 11.69
<b>Sex</b>		
<b>F</b>	100,503 (34.1%)	79,415 (47.2%)
<b>M</b>	194,295 (65.9%)	88,801 (52.8%)



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# DEMOGRAPHICS

Variable	Avoidable Mortality Preventable	Avoidable Mortality Treatable
<b>Dependency</b>		
<b>Q1 (lowest)</b>	44,735 (15.2%)	24,555 (14.6%)
<b>Q2</b>	50,896 (17.3%)	28,900 (17.2%)
<b>Q3</b>	57,708 (19.6%)	32,696 (19.4%)
<b>Q4</b>	62,798 (21.3%)	35,902 (21.3%)
<b>Q5 (highest)</b>	78,662 (26.7%)	46,163 (27.4%)
<b>Q5 – Q1 difference</b>	33,927 (11.5%)	21,608 (12.8%)
<b>Ethnic Concentration</b>		
<b>Q1 (lowest)</b>	68,315 (23.2%)	38,738 (23.0%)
<b>Q2</b>	63,345 (21.5%)	35,719 (21.2%)
<b>Q3</b>	56,468 (19.2%)	31,613 (18.8%)
<b>Q4</b>	52,888 (17.9%)	30,199 (18.0%)
<b>Q5 (highest)</b>	53,783 (18.2%)	31,947 (19.0%)
<b>Q1 – Q5 difference</b>	14,532 (4.9%)	6,791 (4.0%)



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# DEMOGRAPHICS

Variable	Avoidable Mortality Preventable	Avoidable Mortality Treatable
<b>Material Deprivation</b>		
Q1 (lowest)	41,391 (14.0%)	24,984 (14.9%)
Q2	49,298 (16.7%)	29,260 (17.4%)
Q3	57,512 (19.5%)	33,475 (19.9%)
Q4	65,722 (22.3%)	37,038 (22.0%)
Q5 (highest)	80,876 (27.4%)	43,459 (25.8%)
Q5 – Q1 difference	39,485 (13.4%)	18,475 (11.0%)
<b>Residential Instability</b>		
Q1 (lowest)	34,861 (11.8%)	21,541 (12.8%)
Q2	50,962 (17.3%)	30,075 (17.9%)
Q3	57,854 (19.6%)	33,676 (20.0%)
Q4	67,164 (22.8%)	37,548 (22.3%)
Q5 (highest)	83,958 (28.5%)	45,376 (27.0%)
Q5 – Q1 difference	49,097 (16.7%)	23,835 (14.2%)



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# AVOIDABLE MORTALITY CLASSIFICATION EXAMPLE

Causes of Death	ICD-9 Codes	ICD-10 Codes	AM - Preventable	AM - Treatable
<b>Infections</b>				
<b>Enteritis and other diarrhoeal disease</b>	001-009	A00 - A09	x	...
<b>Tuberculosis</b>	010-018	A16- A19	...	x
	137	B90		
		J65		
<b>Selected invasive bacterial infections</b>	034.1	A38	...	x
	482.8	A48.1		
	41.0	A49.1		
<b>Sepsis</b>	038 (except 038.2)	A40 (except A40.3) A41 (except A41.3)	...	x
<b>Malaria</b>	084	B50-B54	...	x
<b>Meningitis</b>	320.2,3,8,9	G00.2,3,8,9	...	x
<b>Viral Hepatitis</b>	070	B15-B19	x	...
<b>HIV/AIDS</b>	042.0-044.9	B20-B24	x	...



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