QUANTIFYING CLASS INEQUALITIES IN CANCER:

CONCEPTS, MEASURES, METHODS AND CONTROVERSIES

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WHY CLASS & HEALTH?

- Growing recognition of social class as a critical determinant of population health
- At issue: multiple pathways, across the lifecourse
- Important empirical challenge:
  - how best to study & quantify connections between class & health, including cancer
  - obstacle: eclectic or absent socioeconomic data
- Unscientific--and not neutral--to ignore links between class & health

PURPOSE OF TALK

- Conceptual & methodological:
  - which measures, at which level & time period, for what purpose?
  - guiding perspective: ecosocial theory

- Empirical:
  - example: US cancer registries, geocoding & area-based socioeconomic measures

WHAT IS SOCIAL CLASS?

- Social relationship:
  - interdependent economic relationships among people (not individual attribute)
  - asymmetrical, premised on property & labor
  - one dimension of social position (cf race/ ethnicity, gender, sexuality, etc.)
- Component of socioeconomic position
  - aggregate concept combining resource-based and prestige-based measures
  - "SES": conflates the two and arbitrarily privileges status over material resources

EMBODYING CLASS

- Multiple pathways & levels:
  - "standard of living" (household, community, nation)
  - occupational exposures (paid & non-paid work)
  - environmental exposures (home, work, school, neighborhood, etc.)
  - social exposures (class discrimination)
- Multiple time periods:
  - pre-conception & in utero
  - childhood & adolescence
  - adulthood
- No "one size fits all" exposure-outcome relationship (cf lung vs breast cancer)

MEASURING SEP

- Diverse domains:
  - income
  - poverty
  - wealth (assets, including home ownership)
  - occupation & employment
  - education
  - crowding (>1 person/room)
- Single measures or combined?
  - if combined: assumes underlying construct (vs different measures perform differently)

CHOOSING MEASURES

- Which measure to use:
  - Empirical question, not philosophical principle, to be driven by research question
    - monitoring, etiology, access to/quality of care?
  - At issue:
    - which measure(s), singly or combined?
    - which level(s), for which time period(s)
    - in relation to which other social inequalities in health?
- Poorly chosen measures: obscure more than they reveal (e.g., using only education to investigate contribution of socioeconomic inequality to racial/ethnic disparities)

GEOCODING AND MONITORING US SOCIOECONOMIC INEQUALITIES IN HEALTH: DOES CHOICE OF AREA-BASED MEASURE AND GEOGRAPHIC LEVEL MATTER?— the *Public Health Disparities Geocoding Project*

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RATIONALE FOR STUDY

- Paucity of socioeconomic data in US public health surveillance systems--limits capacity to monitor social inequalities in health
- Possible solution: geocoding & area-based socioeconomic measures
- Problem: no consensus on which area-based socioeconomic measures, at which level of geography (census block group, census tract, ZIP Code)
- Our study: empirical investigation to address this problem, across multiple health outcomes (mortality, cancer incidence, low birthweight, childhood lead poisoning, STDs, TB, non-fatal weapons-related injury)

CRITIERIA FOR ABSMs

- External validity
  - do the measures find gradients in the direction reported in the literature?
- Robustness
  - do the measures detect expected gradients across a wide range of health outcomes?
- Completeness
  - is the measure relatively unaffected by missing data?
- User-friendliness
  - how easy is the measure to understand and explain?

STUDY POPULATION: people

	Massachusetts	Rhode Island
1990 population	6,016,425	1,003,464
Mortality data* (1989-1992)	156,366	27,291
Cancer data** (primary invasive)		
1988-1992	140,610	
1989-1992		19,808

*all-cause, plus analyses of top 5 causes by race/ethnicity: heart disease, malignant neoplasm, cerebrovascular disease, pneumonia and influenza, chronic obstructive pulmonary disease, unintentional injury, diabetes, HIV, and homicide and legal intervention.

*all-cause, plus analyses of breast, cervix, colon, lung, prostate

STUDY POPULATION: areas

	N	Mean population size (SD)	Range
MA			
Block group	5,603	1,085.4 (665.2)	5 to 10,096
Census tract	1,338	4,571.8 (2,080.0)	18 to 15,411
ZIP Code	474	12,719.7 (12,244.1)	14 to 65,001
RI			
Block group	897	1,137.7 (670.8)	7 to 5,652
Census tract	235	4,325.3 (1,810.9)	26 to 9,822
ZIP Code	70	14,335.2 (13,234.8)	63 to 53,763

ABSMs

- Occupational class
  - working class; unemployment
- Income
  - median household; low; high, Gini coefficient
- Poverty
- Wealth (expensive homes)
- Education
  - low (< high school); high (>= 4 yrs college)
- Crowding
- Composite
  - Townsend index; Carstairs index; Index of Local Economic Resources
  - SEP1; SEP2; factor 1; factor 2; SEP index

note: missingness typically <1% (but wealth: 4%)

GEOCODED RECORDS (MA)

	% of records geocoded to:	
	Mortality (n = 156,366)	Cancer Incidence (n = 166,370)
Block group	93.8	92.2
Census tract	99.8	100.0
ZIP Code*	99.9	100.0
not geocoded	0.1	0.0

* of the total MA & RI records geocoded to the ZC level, 6.3% could not be linked to 1990 census ZC data (non-residential ZC or ZC created or changed after 1990 census)

CERVIX: RATES (MA)

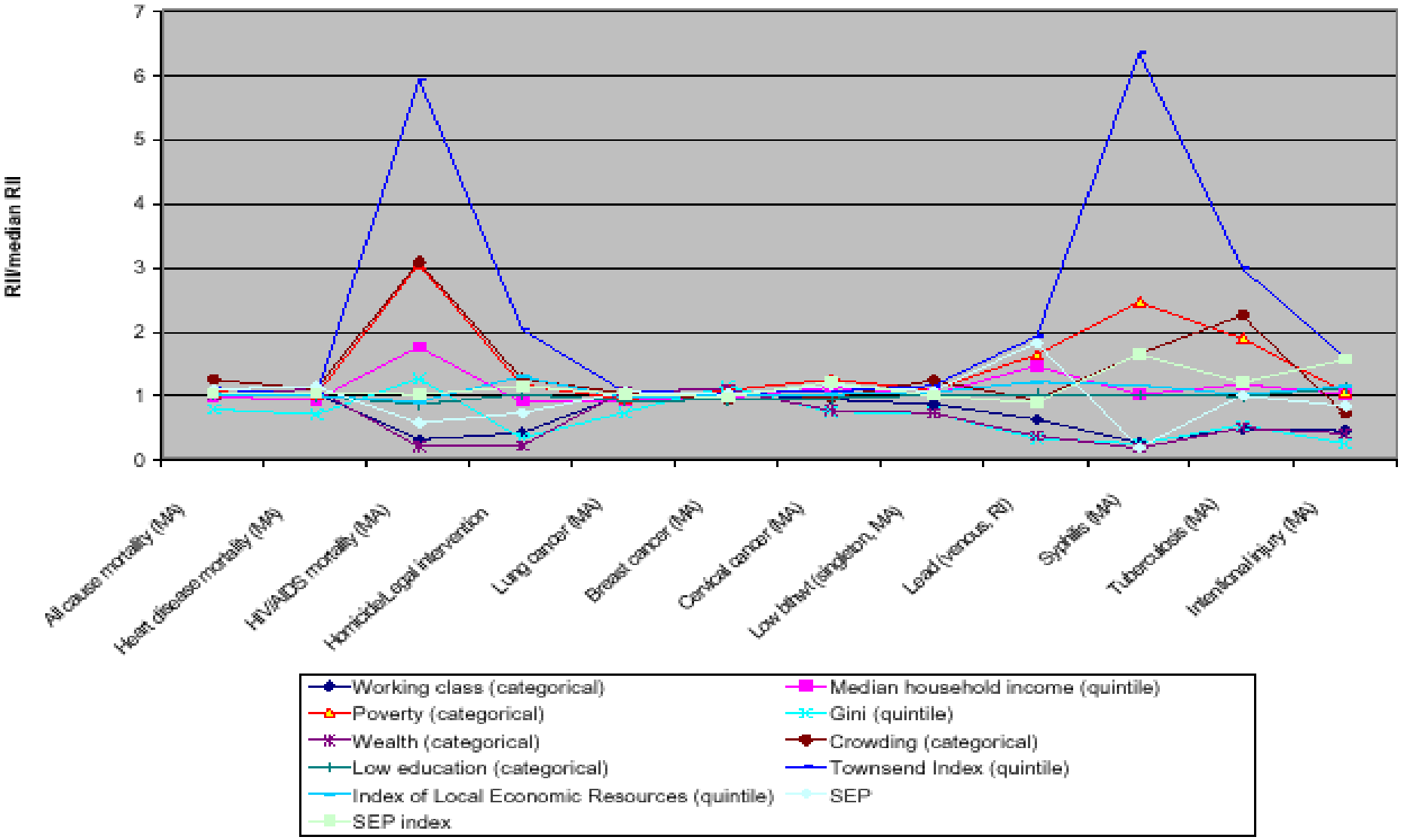
ABSM	Rate: least resources			Rate: most resources		
	BG	CT	ZC	BG	CT	ZC
Working class	13.1	14.4	11.7	6.3	6.9	4.2
Median HH income	13.8	14.2	11.8	6.4	7.1	5.7
Poverty	15.9	15.6	14.0	7.3	7.9	7.3
Gini	11.0	12.4	9.7	7.7	8.8	8.5
Wealth	10.0	10.6	10.3	5.7	6.8	5.0
Crowding	17.0	10.0	21.8	8.3	9.1	8.2
Low education	15.0	14.0	11.9	7.0	7.8	6.4
Townsend	14.3	15.1	11.3	6.1	7.5	6.6
ILER	14.8	15.5	12.9	6.5	7.0	5.5
SEP1	17.6	15.1	13.8	6.3	6.7	4.3
SEP index	14.5	15.2	12.3	6.2	6.9	5.4
Median value	14.5	14.4	11.9	6.4	7.1	5.7

CERVIX: RII (MA)

Relative index of inequality (95% CI)

ABSM		BG	CT	ZC
Working class	2.6 (2.1, 3.1)	2.4 (2.0, 2.8)	2.7 (2.2, 3.3)	
Median HH income	2.4 (2.0, 2.9)	2.3 (1.9, 2.7)	2.4 (2.0, 2.9)	
Poverty	2.7 (2.2, 3.2)	2.3 (1.9, 2.8)	2.2 (1.8. 2.6)	
Gini	1.5 (1.3, 1.8)	1.5 (1.3, 1.8)	1.3 (1.1, 1.6)	
Wealth	2.3 (1.8. 3.0)	2.4 (2.0, 2.9)	2.7 (2.1, 3.4)	
Crowding	3.5 (2.8, 4.4)	3.1 (2.4, 4.0)	3.0 (2.3, 3.9)	
Low education	2.5 (2.1, 3.0)	2.3 (1.9, 2.7)	2.4 (2.0, 3.0)	
Townsend	2.8 (2.3, 3.3)	2.4 (2.0, 2.9)	2.1 (1.7, 2.5)	
ILER	2.7 (2.2, 3.2)	2.5 (2.1, 3.0)	2.8 (2.4, 3.4)	
SEP1	3.0 (2.4, 3.6)	2.6 (2.2, 3.2)	2.9 (2.3, 3.6)	
SEP index	3.0 (2.4, 3.6)	2.6 (2.1, 3.1)	2.7 (2.3, 3.3)	
Median value	2.6	2.4	2.7	

SCALED RII PLOT (BG)



KEY FINDINGS

- Choice of both area-based socioeconomic measure (ABSM) and geographic level matters

- Level of geography:
  - similarity of block group & census tract expected
  - worth effort compared to use of potentially more misleading ZIP Code data (and no ZIP Codes in 2000 census, only ZCTA)

- Choice of area-based socioeconomic measures:
  - Overall: robust, but some evidence of different measures more relevant for different pathways
  - Measures of economic deprivation: most sensitive, across all outcomes

CAVEATS & COMPARISONS

- Sources of error & bias
  - Geocoding & underregistration of cases: if associated with poverty, then a conservative bias
  - ABSM: very small % missing data
  - Temporal: simultaneity ok for monitoring (burden of disease; not same as etiologic research)
  - Spatial correlation: precision (vs adjacency)
  - Ecologic fallacy: not relevant
- Comparison to prior studies
  - None directly comparable
  - US research: 6 studies, focus on individual vs ABSM methods (BG & CT more consistent than ZC)
  - UK research: different area-based measures of deprivation, but at same level of geography
  - No studies: stratified by race/ethnicity & gender

CHOOSING AN ABSM: CRITERIA

- Based on:
  - our *a priori* criteria (external validity; robustness; completeness; user-friendliness), and
  - desirable attributes of an indicator (Rossi & Gilmartin, 1980)
    - conceptually-based
    - constructed from valid, reliable, and accessible data using appropriate statistical techniques
    - comparable over time and across population groups; and
    - readily understandable, with normative value relevant to timely policy making

TENTATIVE CONCLUSION

- Efforts to monitor US socioeconomic inequalities in health using area-based socioeconomic measures will be best served
  - by those tract or block group measures that are
    - most attuned to capturing economic deprivation
    - meaningful across regions and over time. and
    - easily understood
  - hence based on readily interpretable variables with *a priori* categorical cut-points

- Likely candidate:
  - US census tract data on % below poverty

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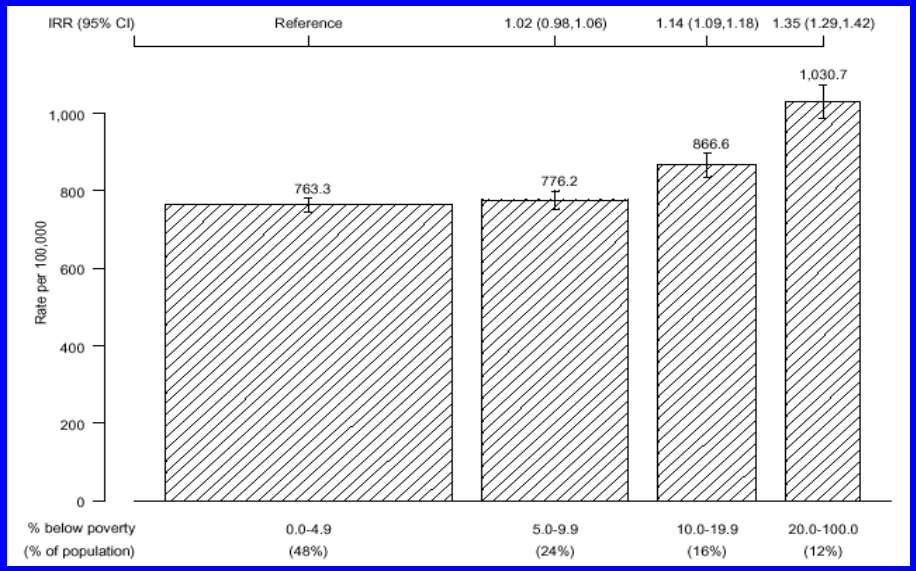
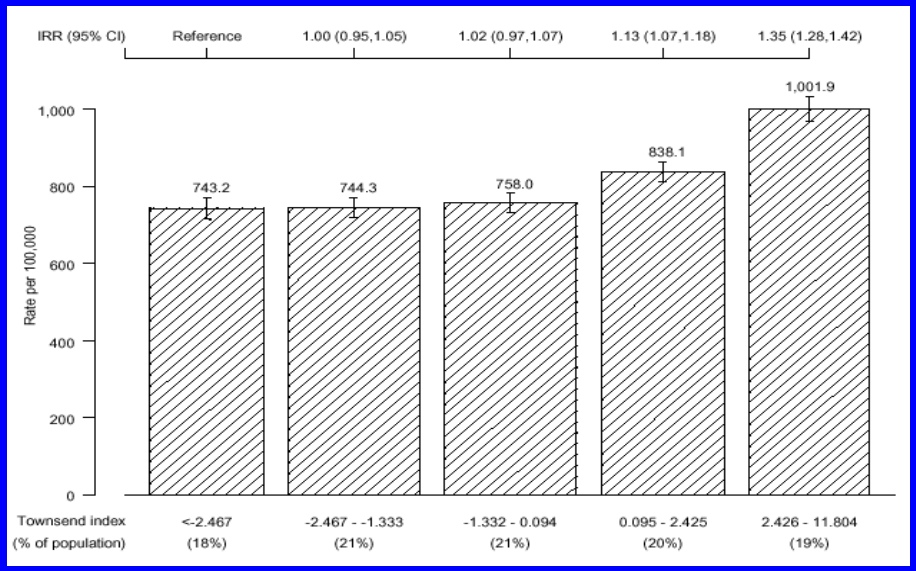
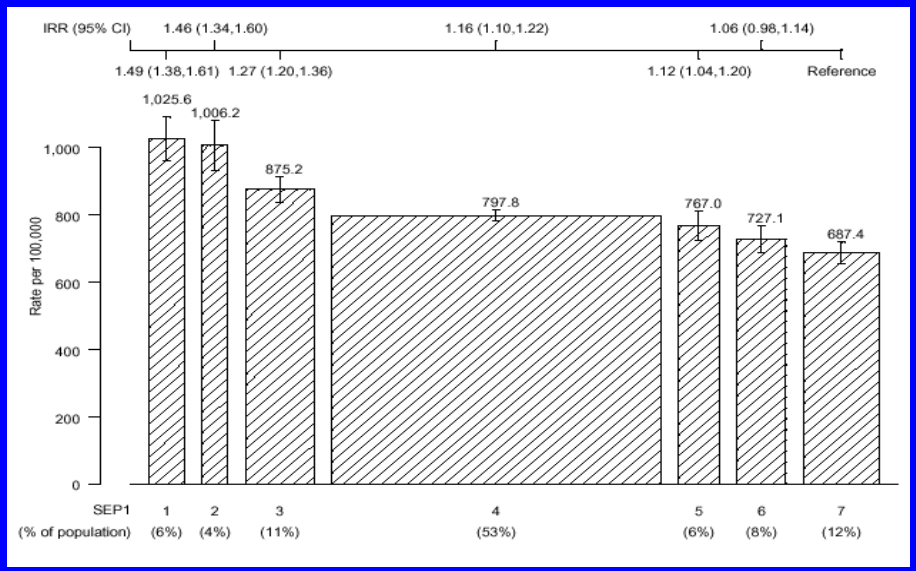
Extra slides

ALL-CAUSE MORTALITY (MA)







BG: % below poverty

BG: Townsend index

BG: SEP1 (poverty, occupation, and wealth)

QUESTION: which best conveys information?

MEDIAN RII(MA)

	Median relative index of inequality		
Outcome	BG	CT	ZC
Cancer incidence			
All sites	0.9	0.9	1.2
Lung	1.4	1.3	1.4
Breast	0.8	0.7	1.0
Cervix	2.6	2.4	2.7
Prostate	0.6	0.6	0.9
Colon	0.9	0.9	1.2
Cancer mortality			
All sites	1.2	1.1	1.2