



# Identifying and Addressing Inequalities in Health: Research Priorities

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# Presentation Outline

- Disparities in cancer incidence and survival
  - US and Canadian gradients
- Exploring pathways to disparity induced gradients
- Recommended Next Steps

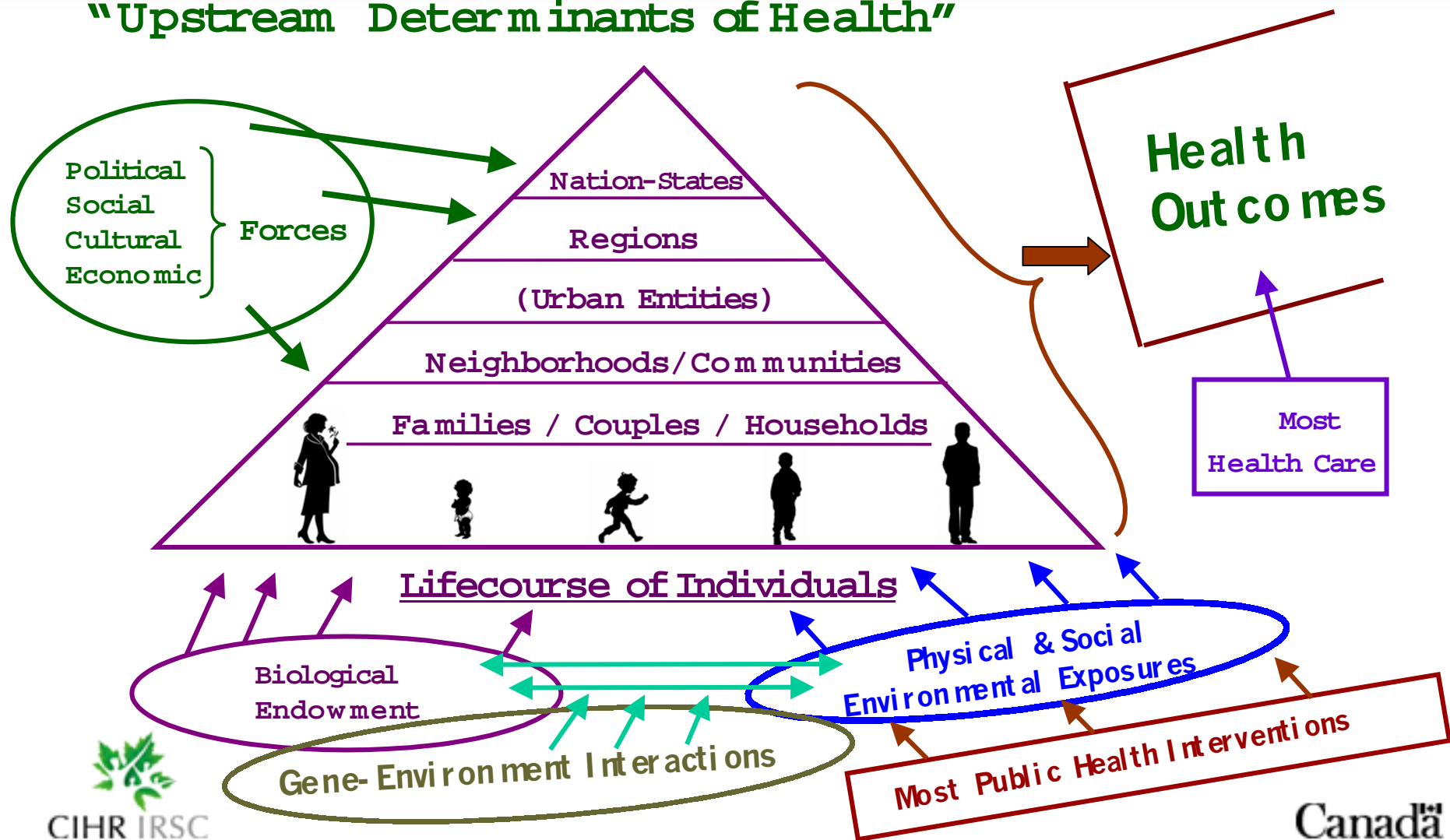
# Burden of Disease

- By Age-adjusted PYLL (Potential Years of Life Lost), 1996:
  - 1) Cancers
  - 2) Accidents
  - 3) Heart Disease
  - 4) Suicide
  - 5) Respiratory Diseases

» (Statistical Report on the Health of Canadians, 1999)

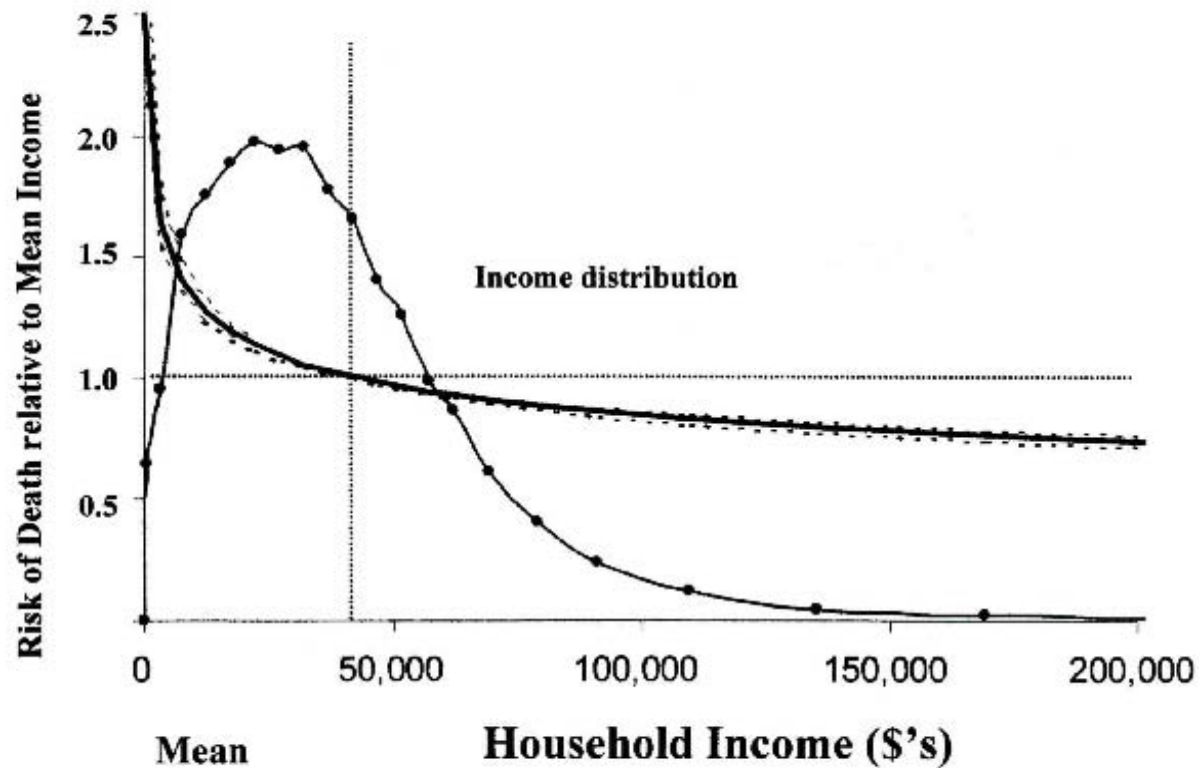
# Population Health Framework

“Upstream Determinants of Health”



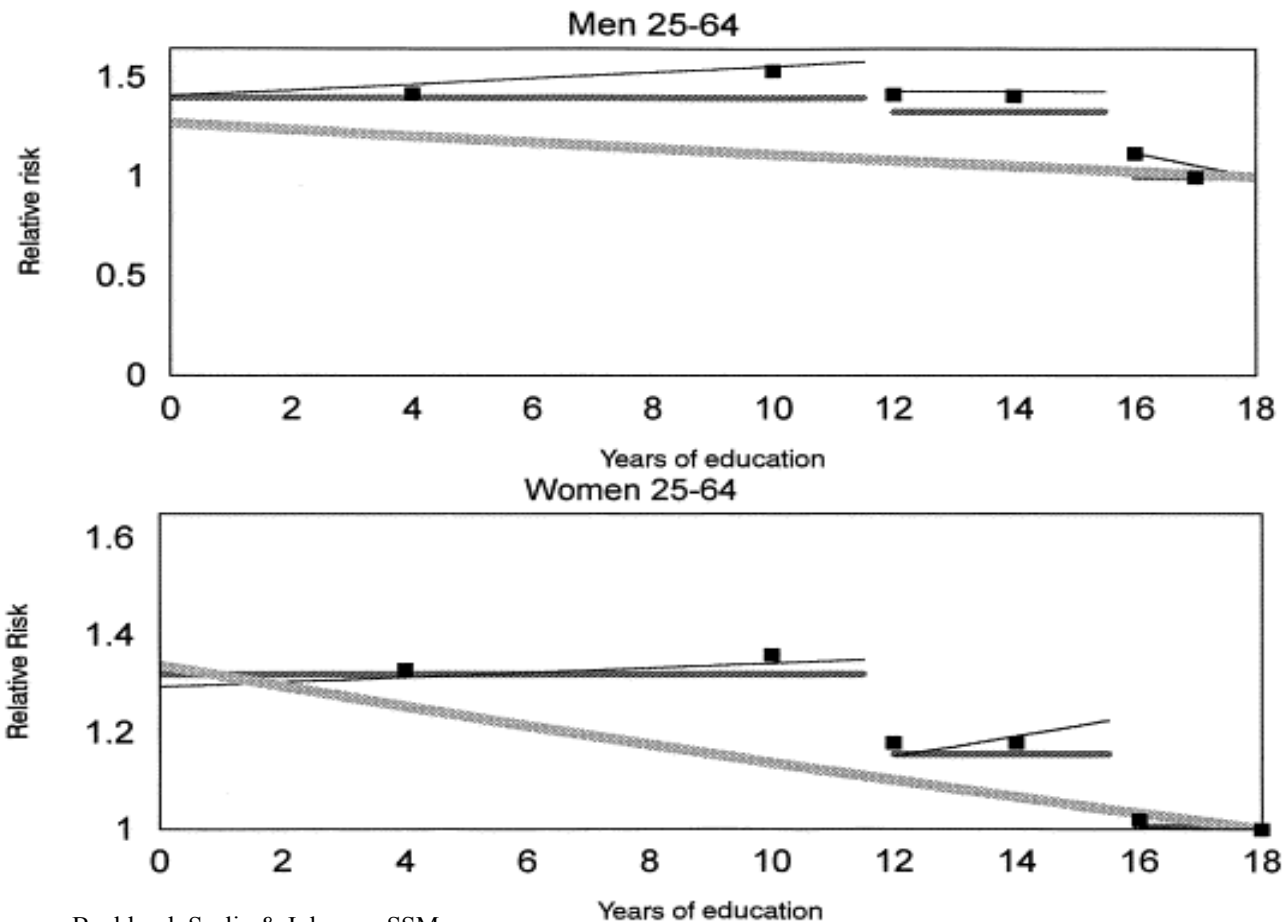
# Relative Risk of Death by Income and Income Distribution

**Relative Risk of Death by Income & Income Distribution**



Wolfson, Kaplan, Lynch, Ross, Backlund, BMJ 1999; 319:953-7.

# Relative Risk of Death by Education Level



Source: Backlund, Sorlie & Johnson, SSM, 1999, 49:10

# SES gradient shapes: Issues raised

- Reverse causality
- Contributions of various cause specific mortality rates by SES not well studied
- Steepness of CHD gradient may have increased in recent decades due to selective adoption of prevention and treatment measures by high SES

# Priority Diseases: Large Preventable Burden of Disease

- E.g. Cancer – 2/3 of cancer deaths are preventable
  - Smoking (30% of cancer deaths)
  - Diet / obesity (30 %)
  - Lack of physical activity (5 %)
  - Infections (5%)
  - Excess alcohol (3 %)
  - **SES (3 %)**
  - Sun/UV/Radiation exposure (2 %)
  - Environmental Pollution (2 %)

## References

- i) Colditz GA, DeJong HW, Hunter DJ et al., eds. Harvard Report on Cancer Prevention. Cancer Causes & Control 1996 (November); Volume 7 (Supplement). ([www.hsph.harvard.edu/Organizations/Canprevent/contents.html](http://www.hsph.harvard.edu/Organizations/Canprevent/contents.html)).
- ii) Marrett LD, Theis B, Ashbury FD and Expert Panel. Workshop Report:
- iii) Physical Activity and Cancer Prevention. Chronic Diseases in Canada 2000; 21(4): 143-9.
- iv) World Cancer Research Fund / American Institute for Cancer Research. Food, Nutrition and the Prevention of Cancer: a global perspective. Washington, 1997.

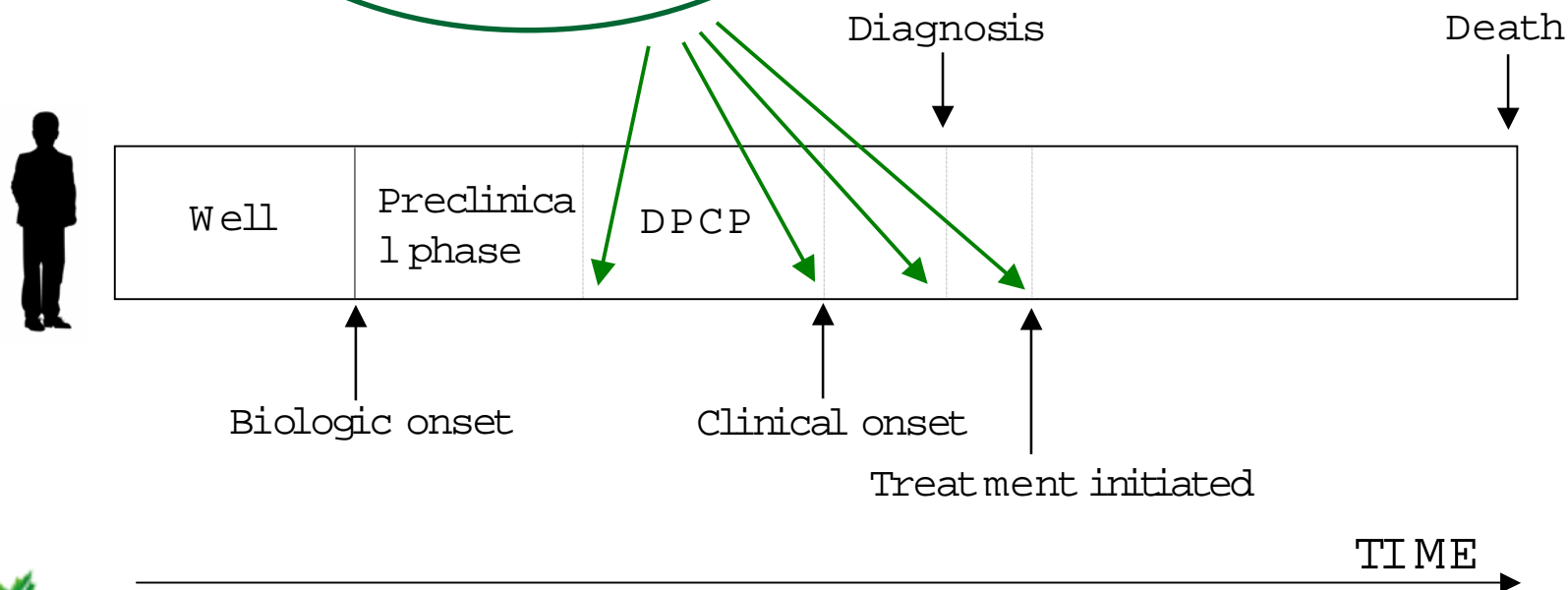


# SES: Care mediated pathways

SES may influence quality of care, coverage and compliance.

For example, with ↑ SES:

- ↑ screening uptake
- ↑ screening/ aftercare quality
- ↑ follow-up/Rx compliance



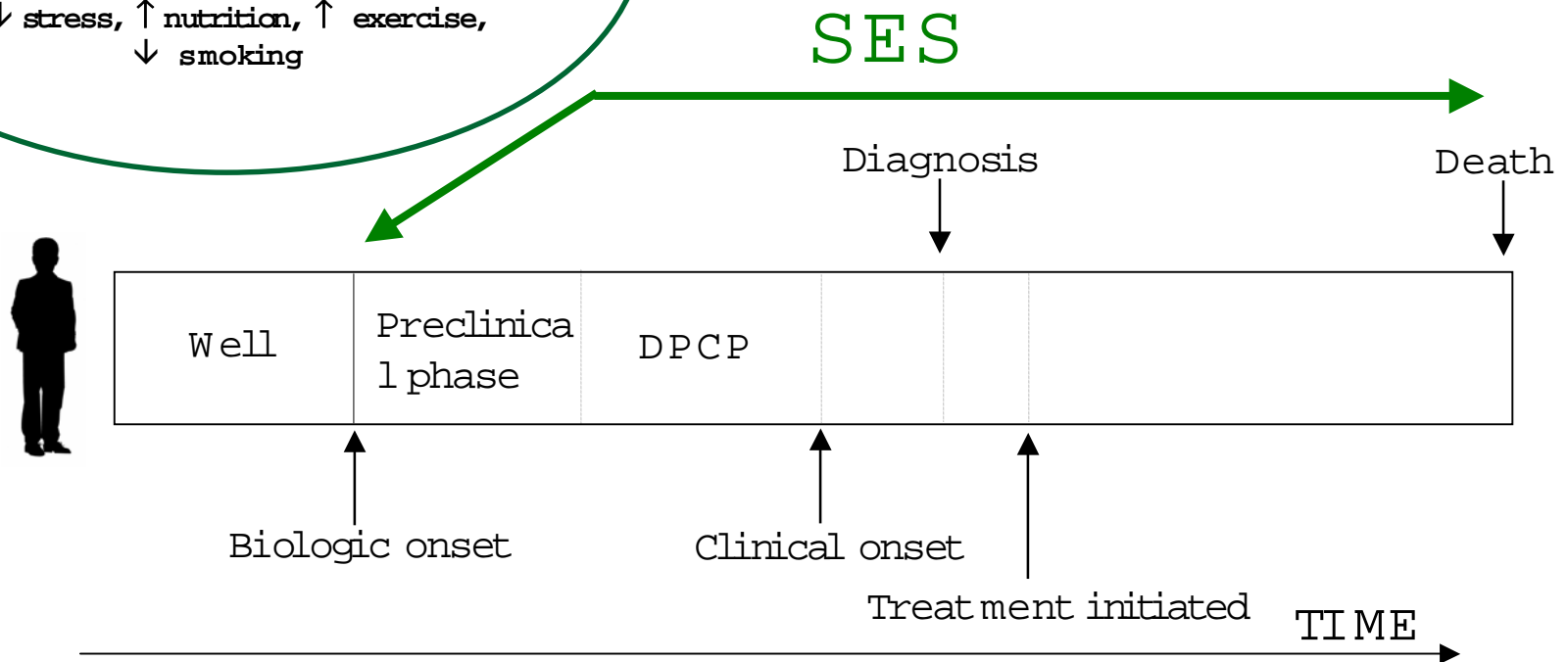
# SES: Inherent tumour aggressiveness pathway

SES may effect properties of tumour, including doubling time and metastatic potential.

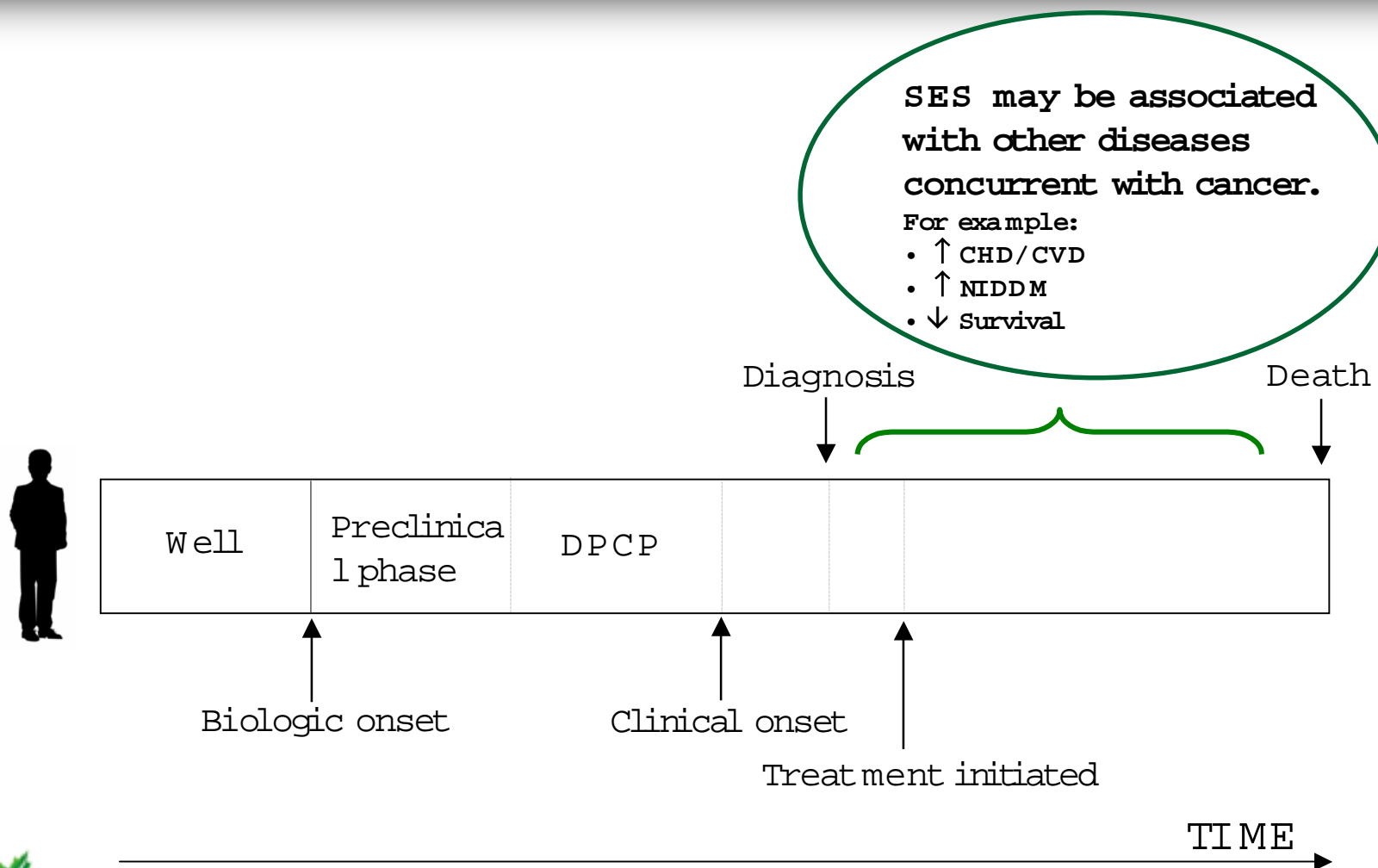
PNI/PNE mechanism.

For example, with  $\uparrow$  SES:

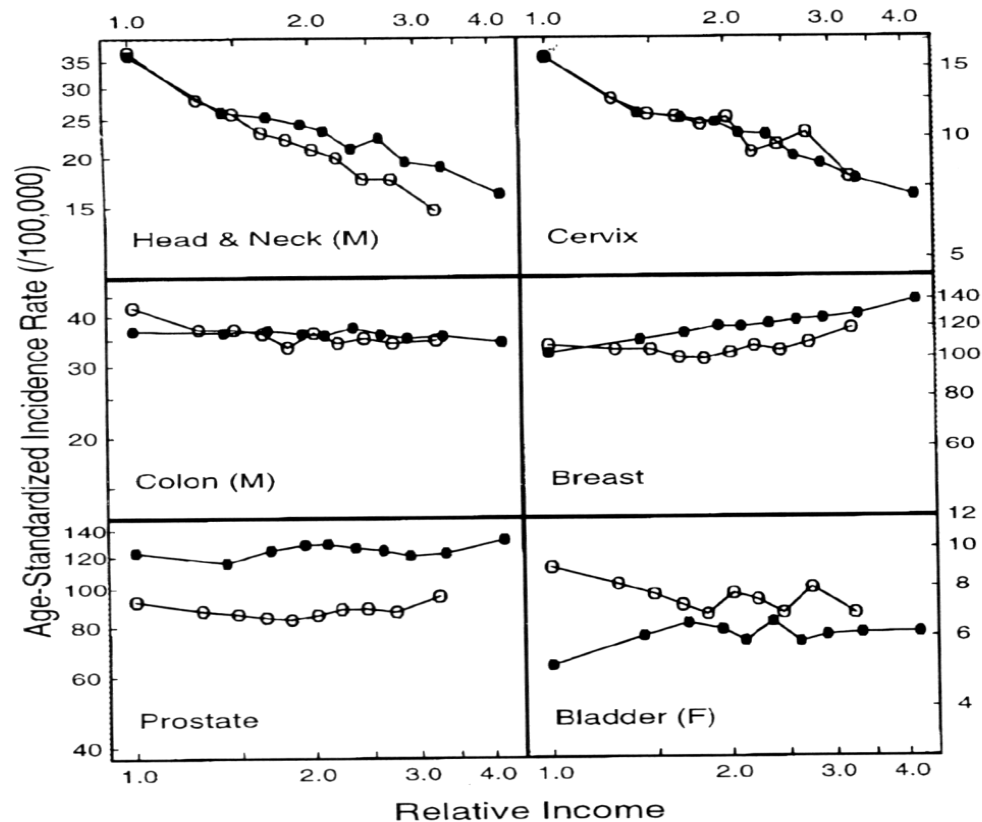
- $\downarrow$  stress,  $\uparrow$  nutrition,  $\uparrow$  exercise,  $\downarrow$  smoking



# SES: Comorbidity pathway



# Income-associated incidence gradients: U.S. and Canada



Filled = U.S.

Open = Canada

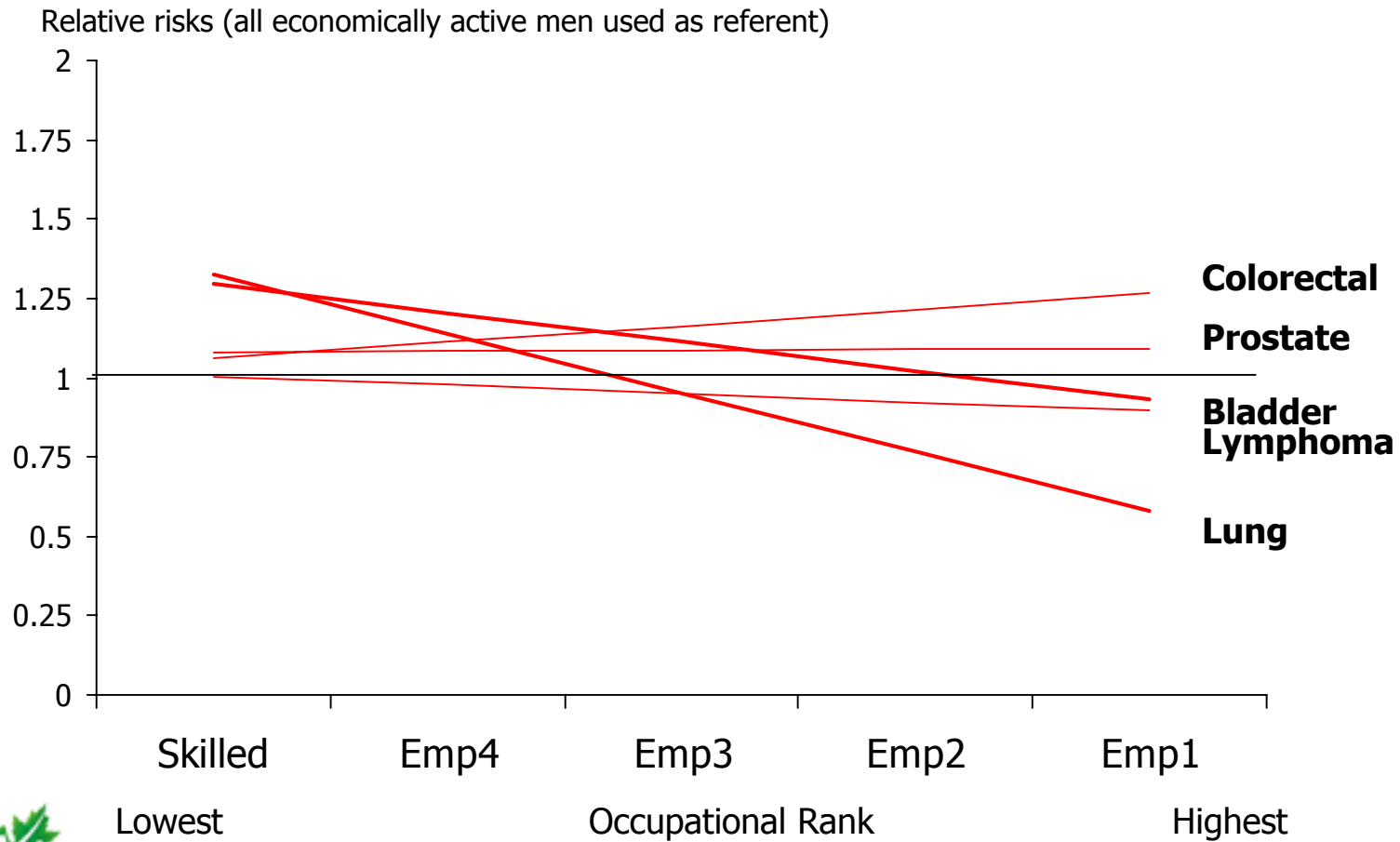
# QUESTIONS:

- How much of: a) the SES gradients;  
b) the US-Can  
difference  
for each cancer site, is due to:
  - differential screening test  
utilization?
  - differential "incidental early  
case-finding, as a side-  
of high-care use?  
benefit



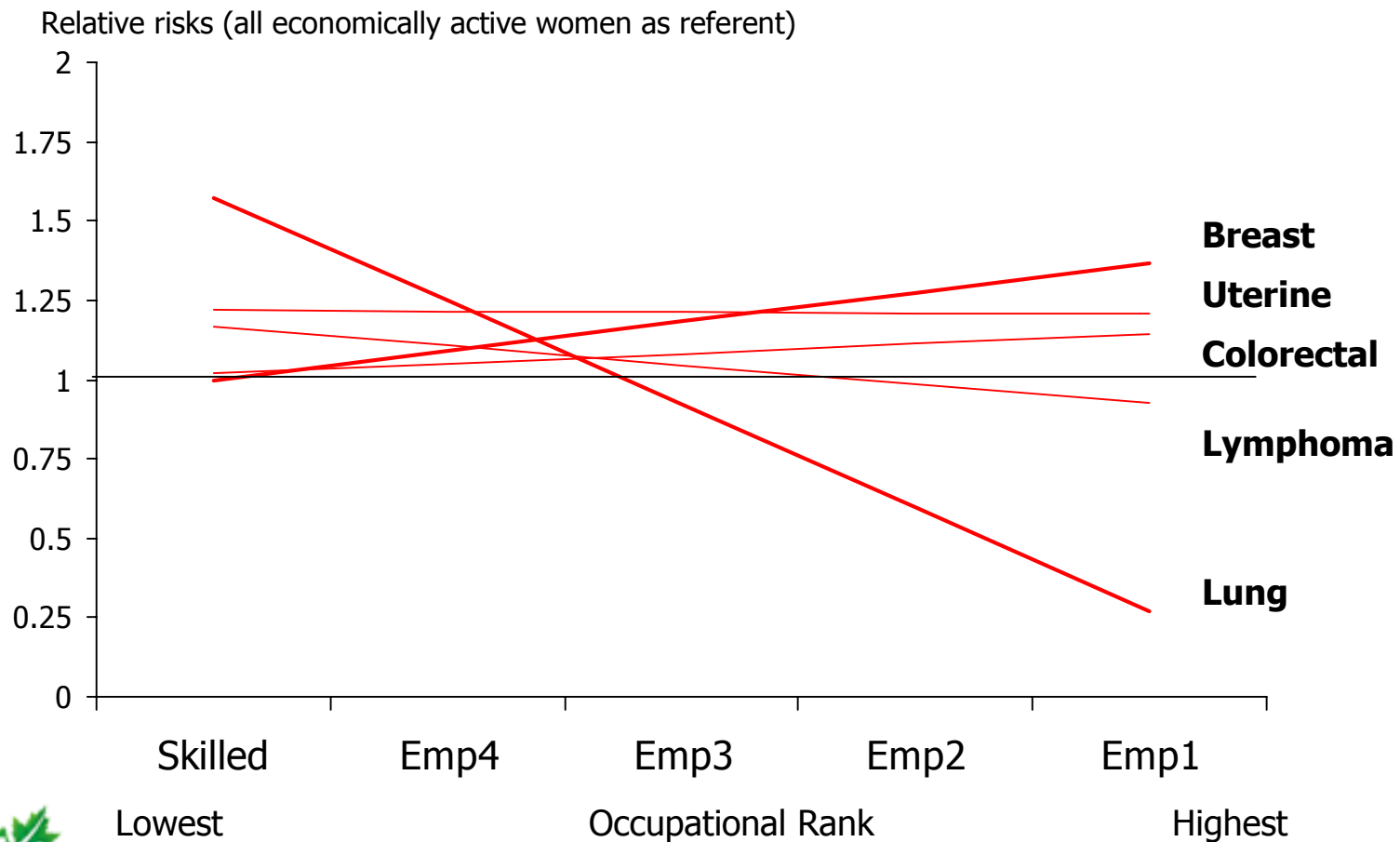
# Socioeconomic Gradient in Incidence of Five Major Cancers; Men, Denmark 1970-1980

Lynge E, Thygesen L. Occupational cancer in Denmark. Copenhagen 1990.

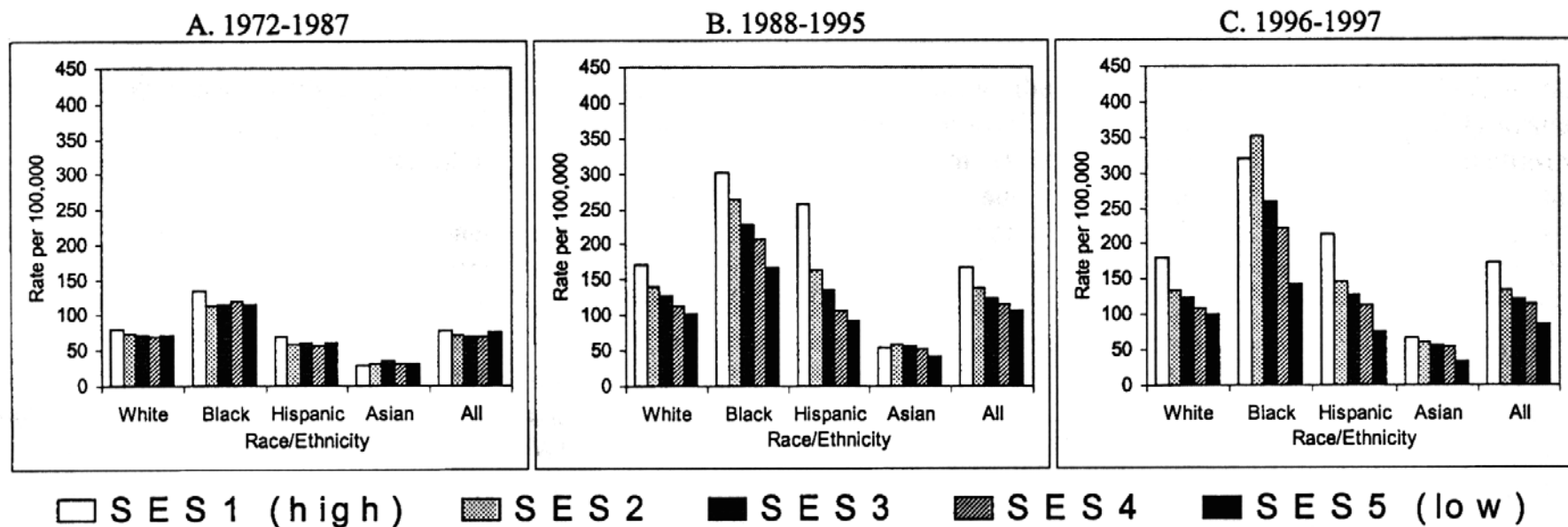


# Socioeconomic Gradient in Incidence of Five Major Cancers; Women, Denmark 1970-1980

Lynge E, Thygesen L. Occupational cancer in Denmark. Copenhagen 1990.

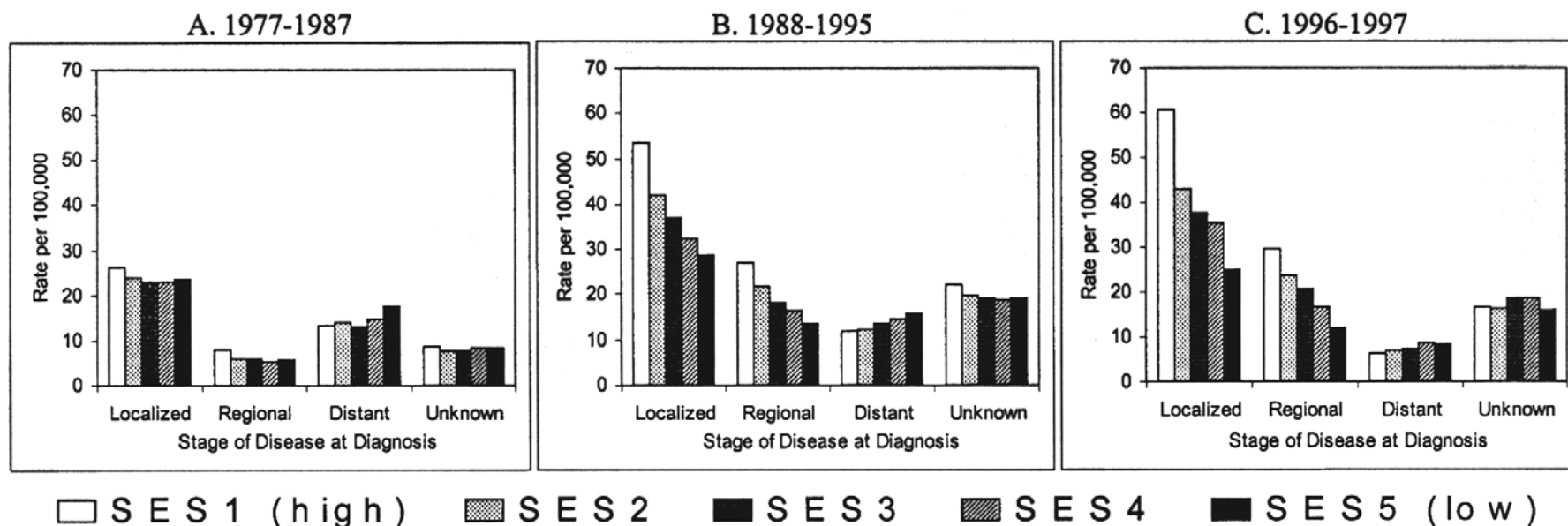


# Period effects of PSA testing: changing prostate CA incidence in LA

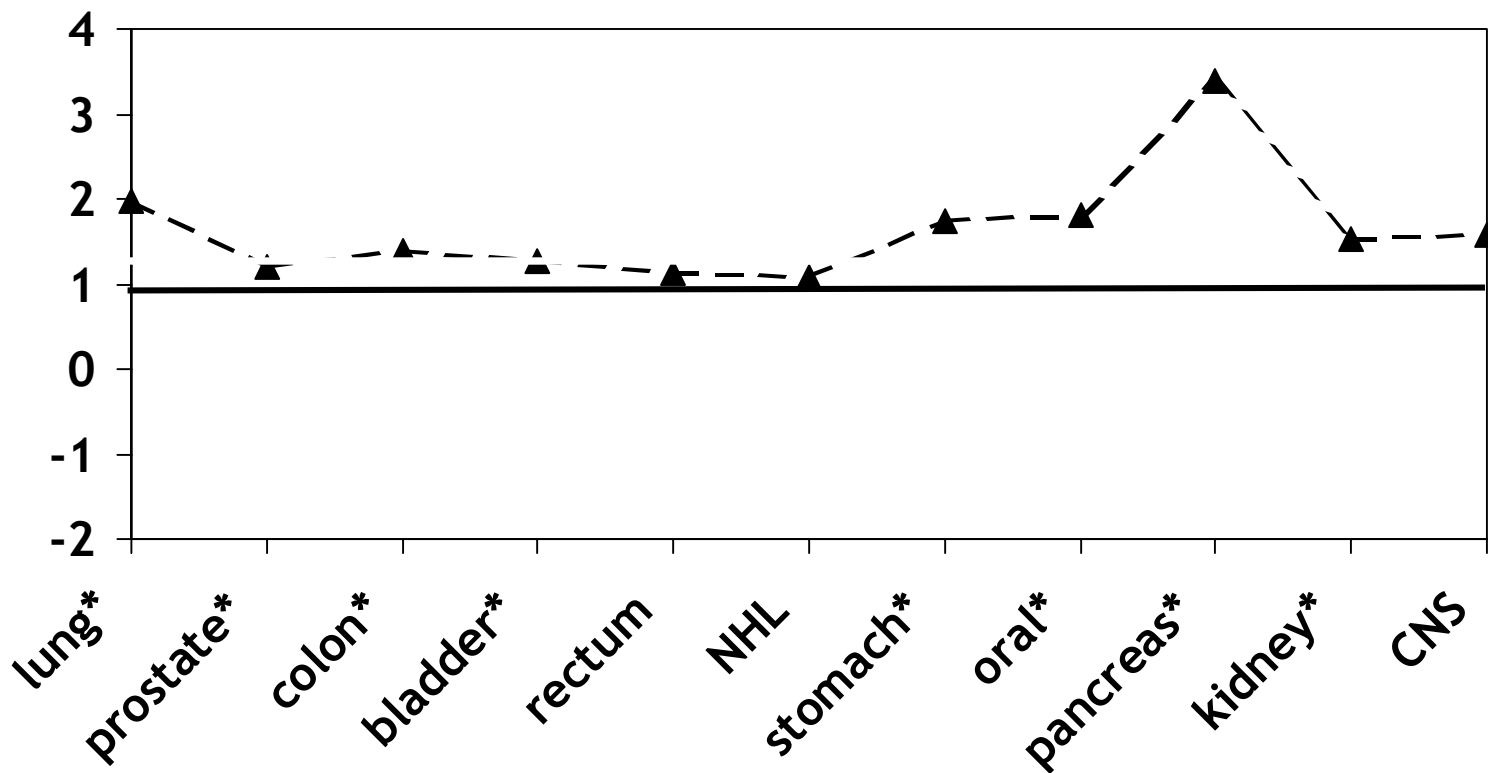




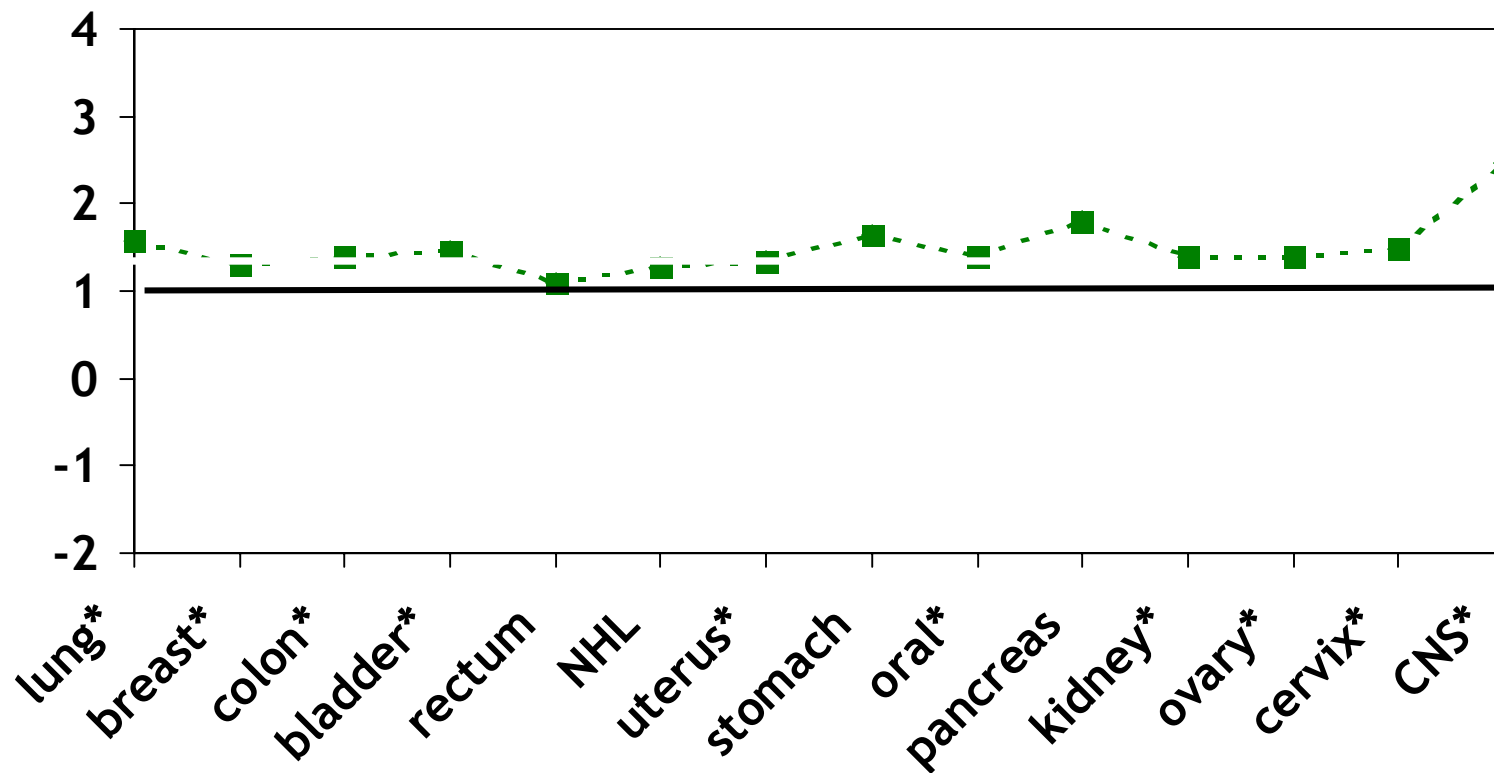
# Socioeconomic status and stage of disease: Period effects in LA county



# Survival rate ratios for lowest-income areas: Toronto versus Detroit. Males



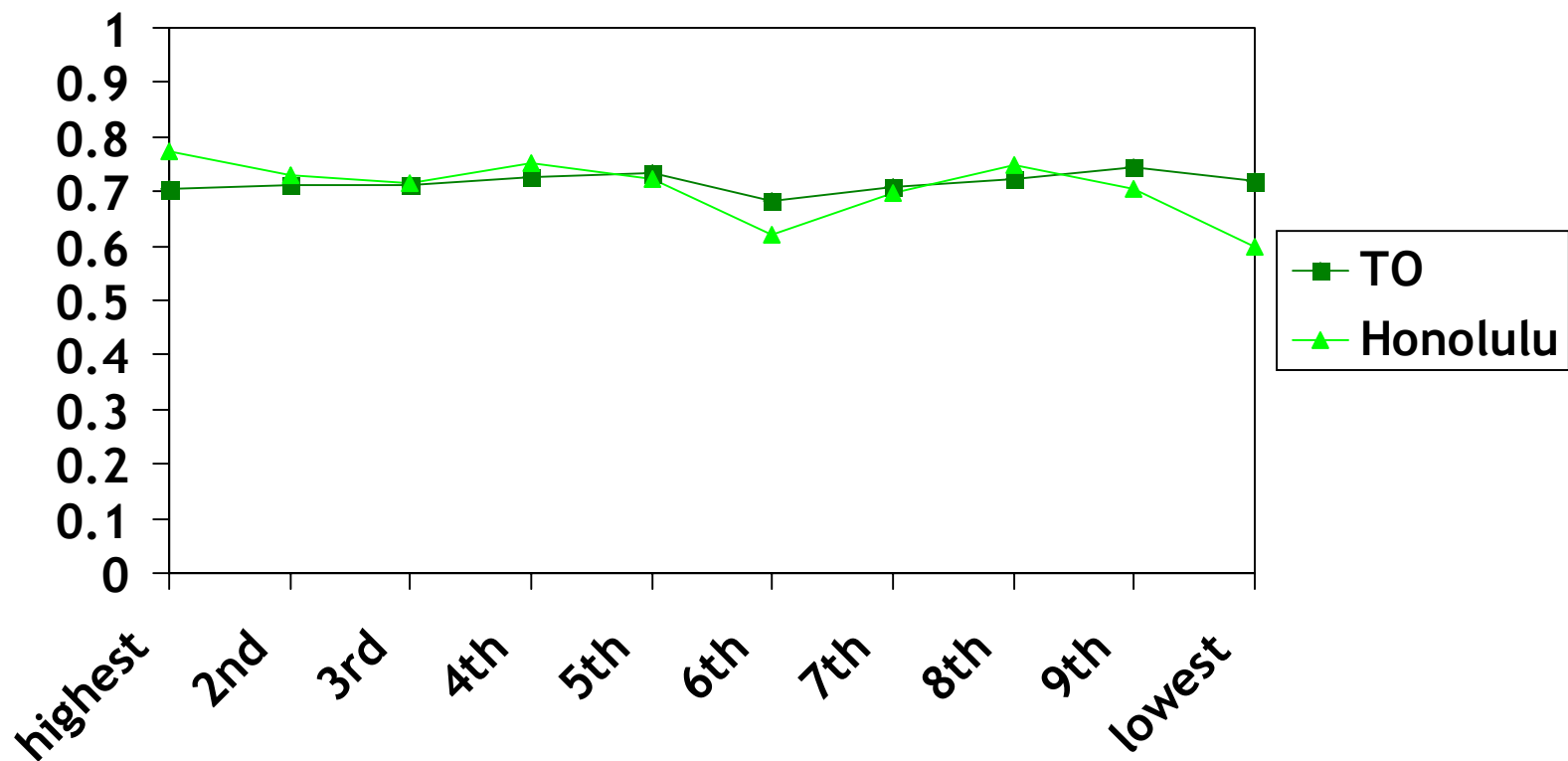
# Survival rate ratios for lowest-income areas: Toronto versus Detroit. Females



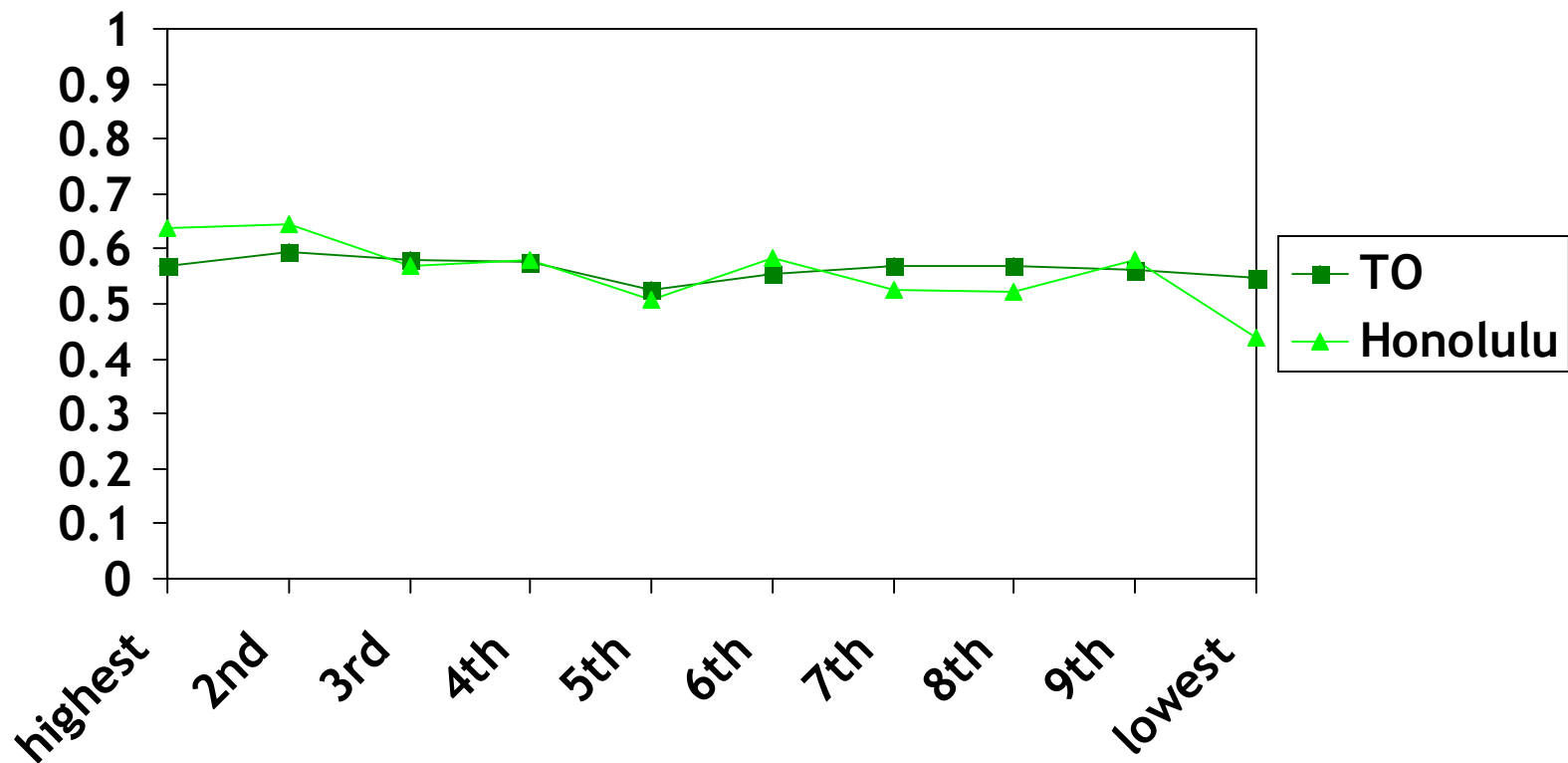
# Survival rate ratios for lowest-income areas: Toronto versus Detroit. Issues

- Methodological issue:
  - 5 year survival conflates SES differences
- Largest TO vs Detroit differences in cancers with less effective treatments
  - Suggests lead time bias and inherent tumour aggressiveness important
- Can the shape of the gradient offer clues?

# Association of income deciles and 5-y survival: Toronto and Honolulu. Breast cancer



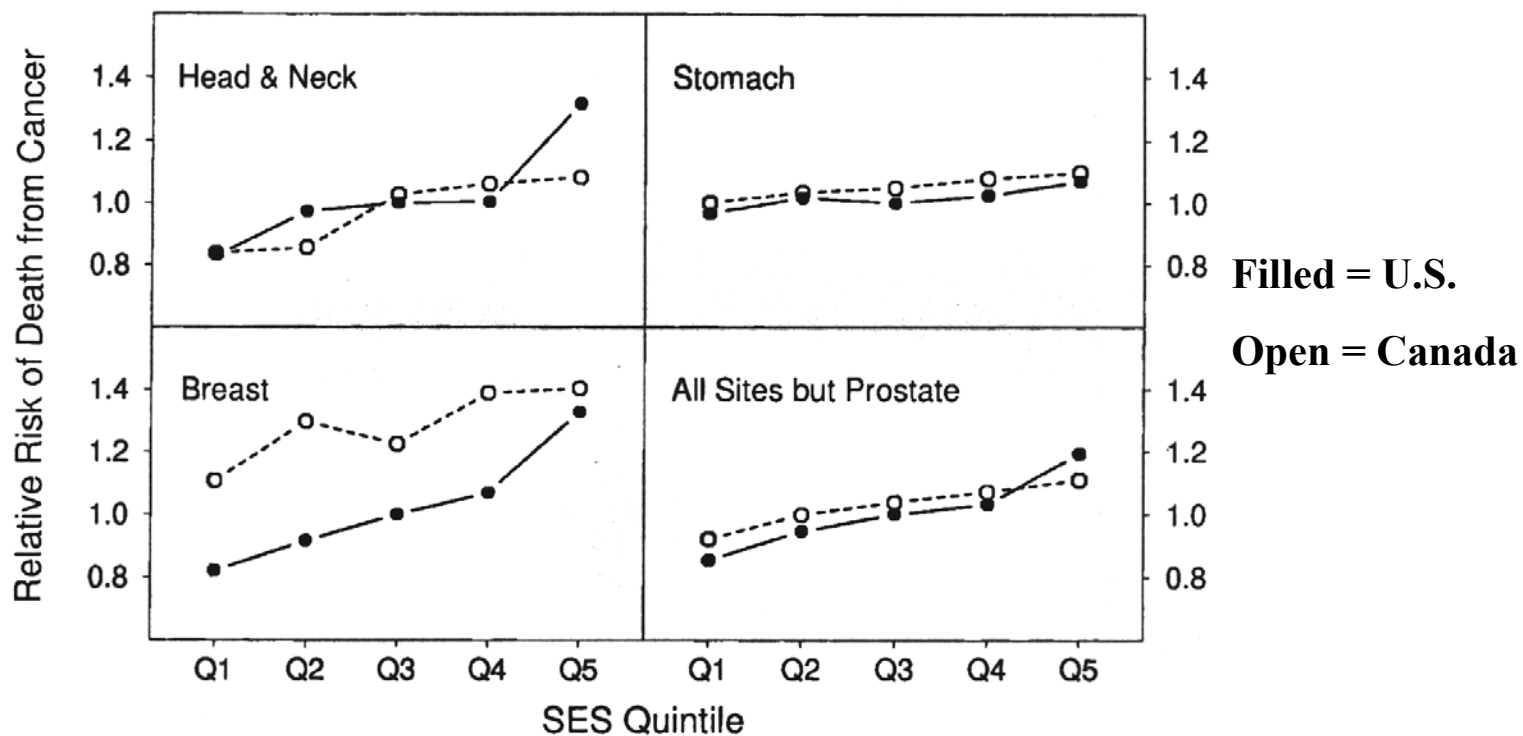
# Association of income deciles and 5-y survival: Toronto and Honolulu. Prostate cancer



# Toronto and Hawaii: Gradient issues

- Gradients at tails of income distribution only
  - Not likely ITA or comorbidity pathway?
- Since treatment effective, which hypothesis fits these curves best?
  - Differential timing of diagnosis?
  - Lead time bias artifact?
  - Differential Rx and compliance?
  - “Free-access” care systems not truly equitable at SES extremes?

# SES associated RR of death from cancer in the US and Canada



Source: Boyd, Zhang-Salomons, et al. JCO, 1999, 17: 2244-2255



# Next steps

- Individual level indicators of SES – more precise measurement of gradient shapes
- Control for confounders – smoking, diet, physical activity, etc.
- Sort out screening-detected cases – how?
- Decompose sources of survival differences – is it treatment, stage of dx, lead time bias etc. –e.g. subanalyze large screening RCTs by SES strata?





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