Inequality in Mortality Over the Life Course: A Comparison of the U.S. and Canada

Michael Baker (University of Toronto)

Janet Currie (Princeton)

Hannes Schwandt (University of Zurich)

Olshansky et al. (2012)

The New York Times

Life Spans Shrink for Least-Educated Whites in the U.S.

By SABRINA TAVERNISE SEPT. 20, 2012

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For generations of Americans, it was a given that children would live longer than their parents. But there is now mounting evidence that this enduring trend has reversed itself for the country's least-educated whites, an increasingly troubled group whose life expectancy has fallen by four years since 1990.

Researchers have long documented that the most educated Americans were making the biggest gains in life expectancy, but now they say mortality data show that life spans for some of the least educated Americans are actually contracting.

Disparity in Life Spans of the Rich and the Poor Is Growing

By SABRINA TAVERNISE FEB. 12, 2016

Patients at the Free Clinic in Newton, N.J. Researchers debate whether expanding access to health care will shrink the gap in life expectancy between the rich and the poor. Credit Joshua Bright for The New York Times

Toronto Star, November 23, 2014

Opinion · Commentary

Income inequality is killing thousands of Canadians every year

A new study from Statistics Canada shows that income inequality is associated with the premature death of 40,000 Canadians per year.

Income inequality is not only bad for our quality of life and economic productivity, it is directly related to the deaths of Canadians on an almost unimaginable scale. (ILLUSTRATION BY LOLA LANDEKIC)

Inequality in Mortality

There has been a great deal of recent research and publicity about increases in inequality in life expectancy and mortality over the past 20 years (e.g. Cutler et al. 2011; Chetty et al. 2015; Lee et al. 2015; Case/Deaton 2015).

Most of this literature focuses on adults 40+, rather than the whole life cycle.

Much of the literature focuses on subgroups defined by education, race, or location.

Recent work in the U.S. shows that:

- While inequality in mortality has grown among adults in the U.S. between 1990 and 2010 *it has declined considerably for young people.*

- That is, while mortality is falling for everyone (with the possible exception of white middle aged women), for young people it is falling fastest in the poorest places while for older people it is falling fastest in the richest places.

- It is not clear what is driving these diverging trends.

In Canada

Ross, Wolfson, Dunn, Berthelot (2000) look at relationship between inequality in income and inequality in mortality in 1991. Use 3-yr averages by municipality and age-sex groups. Find no relationship in Canada.

Auger et al. 2011 use a longitudinal data base that followed 2 million Canadians from 1991 to 2001. Use Gini coefficients for 140 cities. Found a relationship between income inequality and future mortality among Canadian born adults but not among immigrants.

Comparisons between the U.S. and Canada are of interest because:

Technologies for promoting health are broadly similar

Institutions differ – in particular, Canada has public health insurance for all, while the U.S. has public health insurance for those 65+, and introduced public health insurance for low income children in the early 1990s.

Public health insurance, along with expansions of income support programs like EITC and other programs targeted to young children could be responsible for declining mortality inequality in the U.S. in the face of rising income inequality.

If this is the case, perhaps we will not see such convergence in Canada.

Alternatively,

U.S. reductions in mortality among children could be due to better medical care, and organizational changes such as the development and diffusion of trauma units.

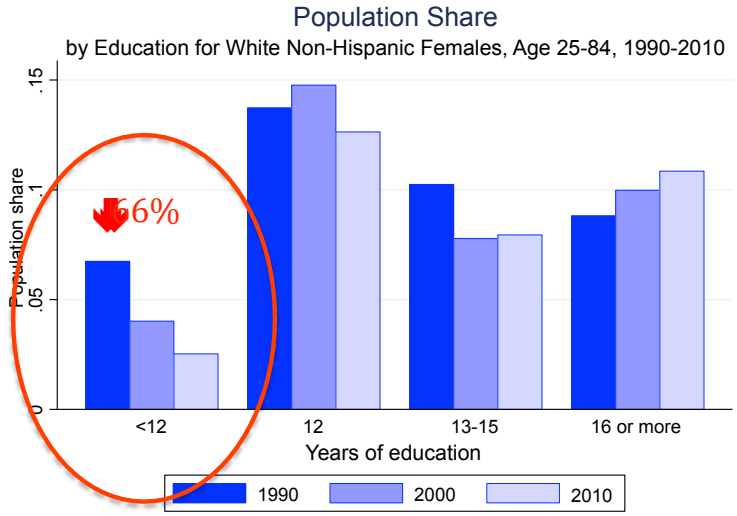
Increases in mortality inequality among adults could reflect patterns of smoking behavior by cohort and socioeconomic status, or opioid use, both of which are broadly similar in Canada and the U.S.

If these types of factors are driving trends, then they may be broadly similar in Canada and the U.S.

Issues with Life Expectancy and Mortality Trends by Education

1. Compositional changes in education groups.
2. Life expectancy based on two separate data sets (Vital Stats and Census) with different changes in reporting of education and race.
3. Education only observable after mid-20s, masking potential differences at younger ages.
4. Deaths by education level not available for Canada.

US Census


Population Share
by Education for White Non-Hispanic Females, Age 25-84, 1990-2010
Population share
0
.05
.1
.15
6%
<12
12
13-15
16 or more
Years of education
1990
2000
2010

County is a relevant dimension that is consistently reported in the U.S. Vital Statistics and Census data over time.

There are over 3100 county or county equivalents in the US

For Canada, we have a choice of geographic unit because counties to not exist in all parts of the country.

Census Divisions (CD)

- There just under 300 (2011)
- In some parts of the country they correspond to cities or counties (the east) in other parts they do not

Census Sub-divisions (CSD)

- There are over 5000 (2011)
- There are 54 "types" ranging from cites to villages and settlements

For the results today we use CSDs which are most comparable to US counties in size and detail

A challenge to tracking mortality rates over time

An issue with tracking mortality rate at the county or CSD level over time is that people are mobile.

If the most able-bodied people are more likely to leave distressed areas, then the average health in those areas will decline over time even if there was no actual change in any individual's health.

Wang et al. Population Health Metrics 2013, 11:8
http://www.pophealthmetrics.com/content/11/1/8

POPULATION HEALTH METRICS

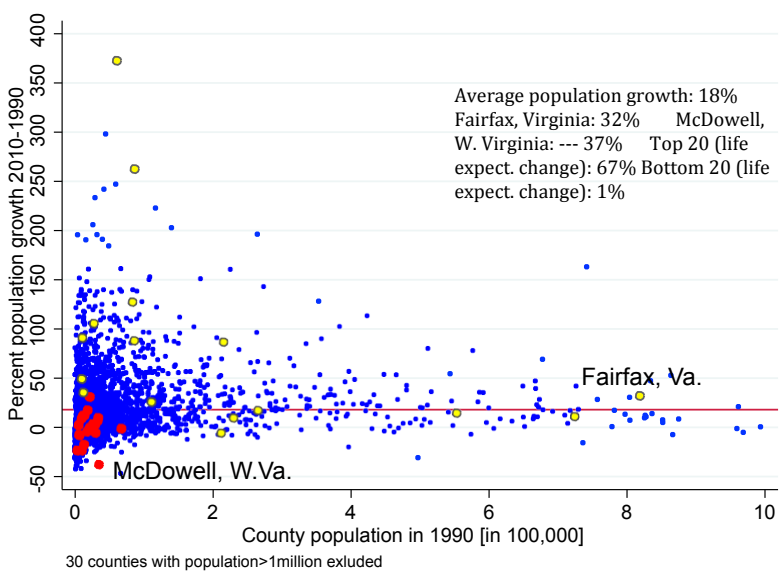
RESEARCH Open Access

Left behind: widening disparities for males and females in US county life expectancy, 1985–2010

Haidong Wang, Austin E Schumacher, Carly E Levitz, Ali H Mokdad* and Christopher JL Murray

Table 2 Top 20 and bottom 20 counties in terms of change in life expectancy by sex, 1985-2010

Top counties					Bottom counties				
Rank (top)	Name	Change in life expectancy	Lower	Upper	Rank (bottom)	Name	Change in life expectancy	Lower	Upper
Females									
1	New York, New York	8.37	7.91	8.79	1	Fayette, Alabama	−3.47	−5.41	−1.71
2	Loudoun, Virginia	7.77	6.59	8.99	2	Harmon, Oklahoma	−3.39	−5.07	−1.6
3	Kings, New York	6.7	6.37	7.03	3	Beckham, Oklahoma	−3.39	−5.07	−1.6
4	Bronx, New York	6.39	5.91	6.85	4	Leslie, Kentucky	−3.17	−4.75	−1.59
5	Gunnison, Colorado	6.28	4.58	7.91	5	Clay, Kentucky	−3.17	−4.75	−1.59
6	Pitkin, Colorado	6.28	4.58	7.91	6	Seminole, Oklahoma	−2.73	−4.35	−1.13
7	Marin, California	6.27	5.47	7.07	7	Haralson, Georgia	−2.58	−4.46	−0.89
8	Prince William, Virginia	6.09	5.02	7.13	8	Murray, Oklahoma	−2.58	−4.06	−1.17
9	San Francisco, California	6.05	5.52	6.61	9	Garvin, Oklahoma	−2.58	−4.06	−1.17


Average population growth: 18%
Fairfax, Virginia: 32%
McDowell, W. Virginia: --- 37%
Top 20 (life expect. change): 67%
Bottom 20 (life expect. change): 1%
Fairfax, Va.
McDowell, W.Va.
Percent population growth 2010-1990
-50
0
50
100
150
200
250
300
350
400
0
2
4
6
8
10
County population in 1990 [in 100,000]
30 counties with population>1million exluded

Our Approach in the U.S.

- We follow mortality, across all ages, in groups of poor and rich counties over time.
- County groups reordered over time to represent constant population shares.

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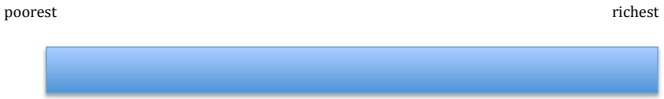

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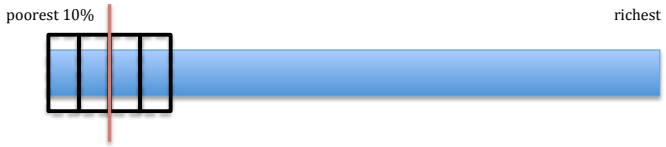

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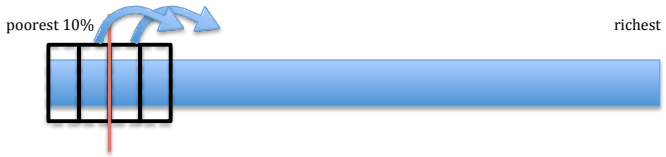

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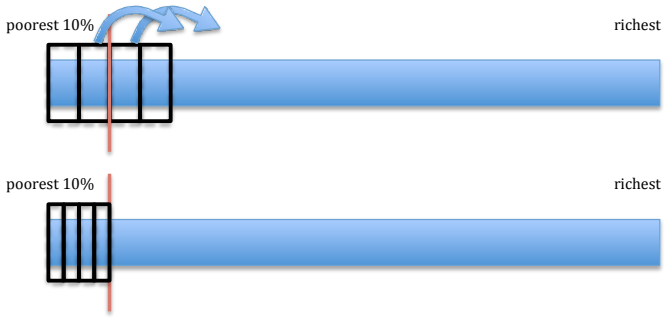

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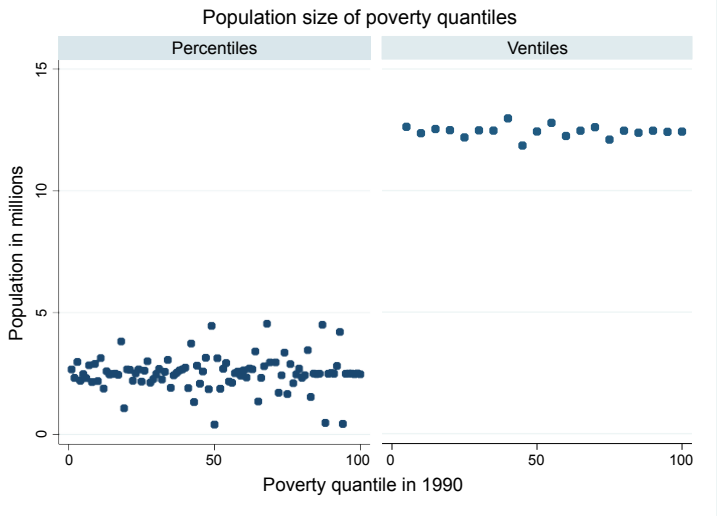
  -Primary focus: Poverty rate. Alternative rankings by income, mortality, education are possible.


Population size of poverty quantiles
Percentiles
Ventiles
Population in millions
0
5
10
15
0
50
100
0
50
100
Poverty quantile in 1990

Our approach in Canada is similar:

Several data issues:

Vital statistics

- Data are only available in Research Data Centers
- Based on administrative data collected by the provinces and territories
- Under or over coverage is thought to be minimal

Population

- CSD population counts are based on the short form census
- Response to the short form is typically very high (>95%)

"Poverty" Rates

- We calculate CSD LICO rates using 1991 and 2001 long form census data and the 2011 National Household Survey (NHS)
- Response rates for long form census (typically >90%) higher than for NHS (~65%)

Canada-Data Issues

Under-coverage of our data sources likely most severe in CSDs with high LICO rates—e.g. Aboriginal communities and reserves

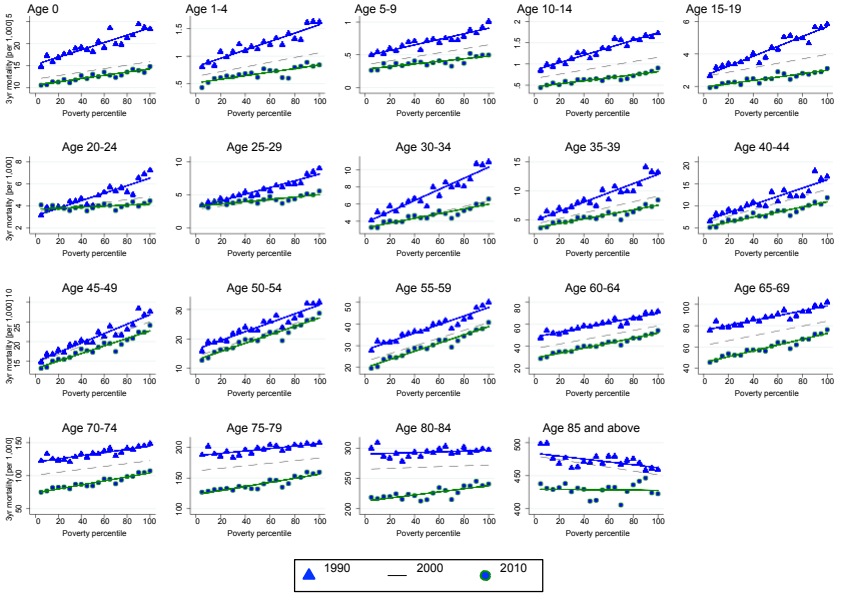
Some CSDs are very small

To account for low response rate in NHS and a disproportionate number of non matched CSDs between the 1991 long form and short form censuses, we are working on a set of results that use a (2001 based) constant ranking of CSDs by LICO rates (in progress)

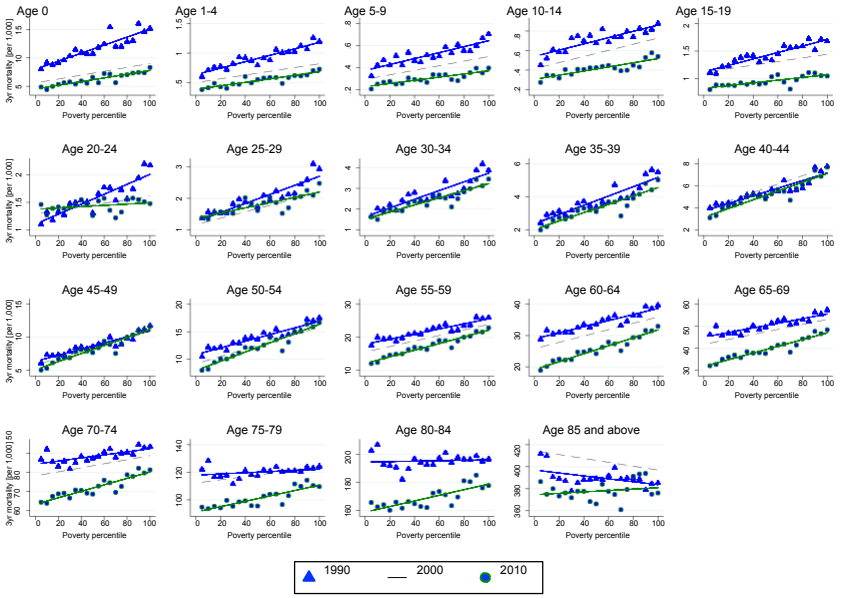
CSDs are less stable than US counties over time and so cross census concordances must be constructed

******Canadian results are preliminary*****

U.S. Male 3 year mortality rates by poverty percentile across age groups



U.S. Female 3 year mortality rates by poverty percentile across age groups



Trends in U.S. Overall Age-Specific Mortality

- Strong mortality improvements across all ages and poverty percentiles (except for women age 25-50, in line with Case/ Deaton 2015).

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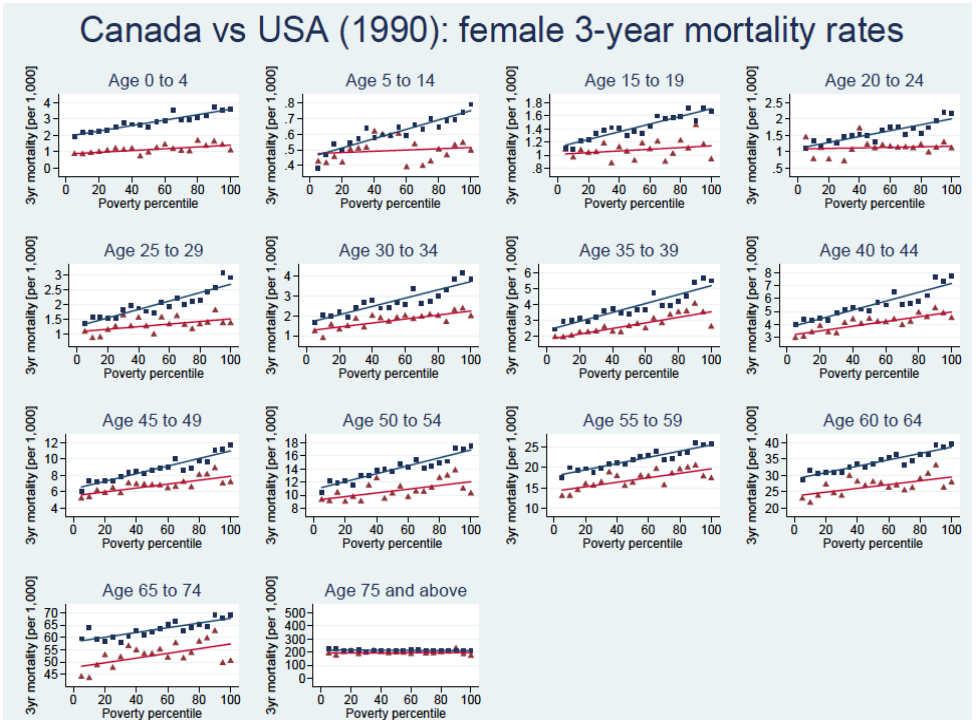
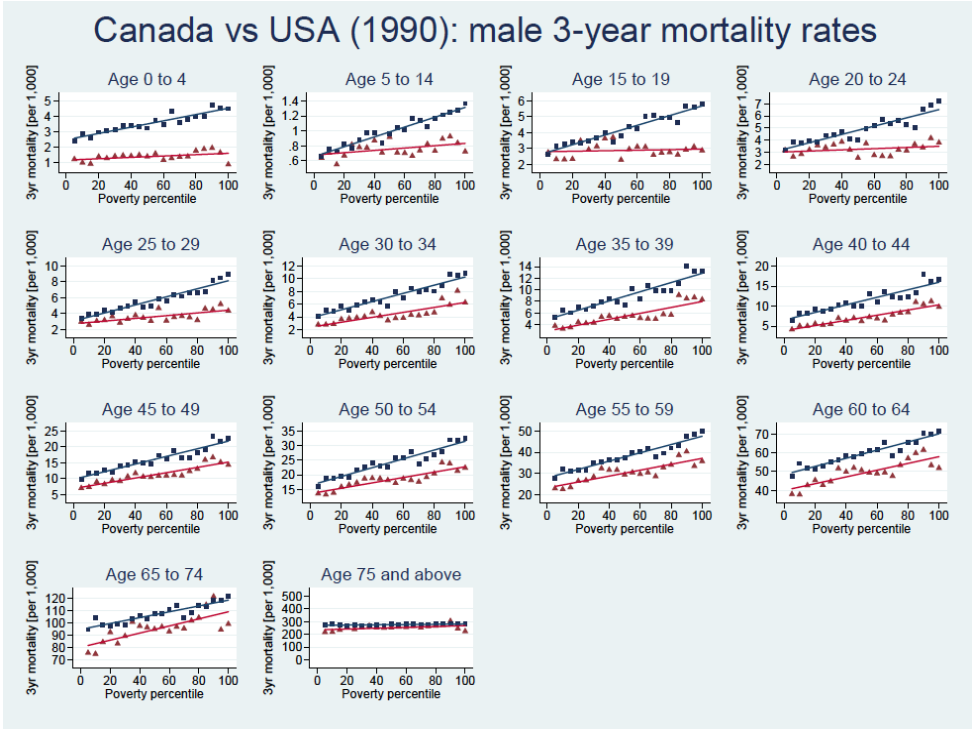

Canada vs USA (1990): female 3-year mortality rates
Age 0 to 4
Age 5 to 14
Age 15 to 19
Age 20 to 24
Age 25 to 29
Age 30 to 34
Age 35 to 39
Age 40 to 44
Age 45 to 49
Age 50 to 54
Age 55 to 59
Age 60 to 64
Age 65 to 74
Age 75 and above
3yr mortality [per 1,000]
Poverty percentile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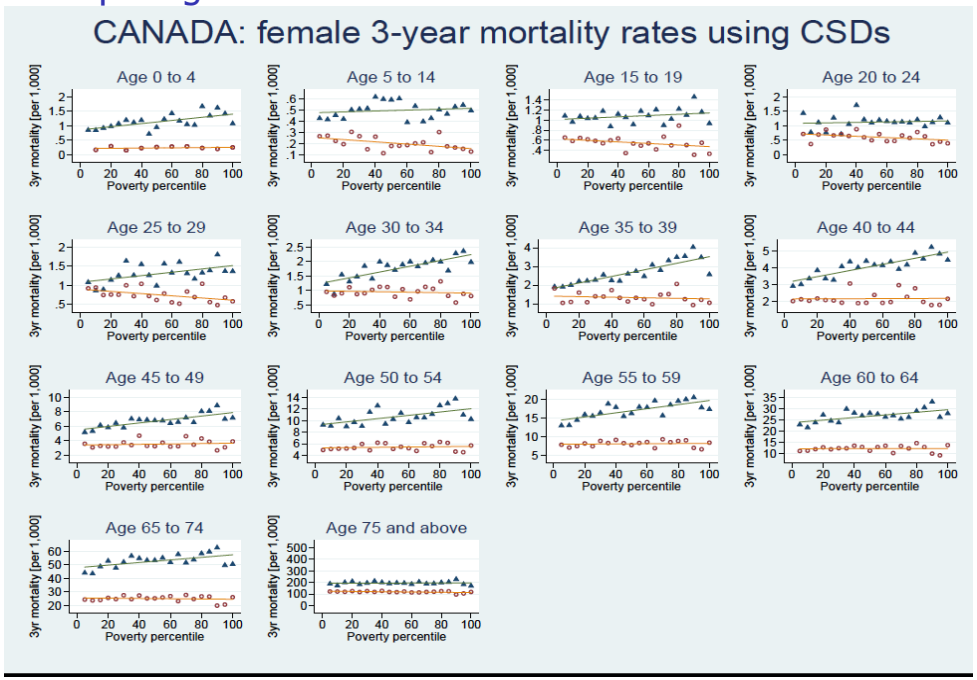
Comments on Baseline Canada-US Comparisons in 1990/1991

- Mortality rates are generally higher in the U.S.
  - Main exception is 75+
  - And also people in the richest U.S. counties in some age-sex groups (females 5-24, males 5-29).

- Lines generally slope upwards indicating that poorer places have higher mortality rates.
  - Main exception is 75+ and young children who have almost flat profiles in Canada in 1990/91.

Comparing 1991 and 2011



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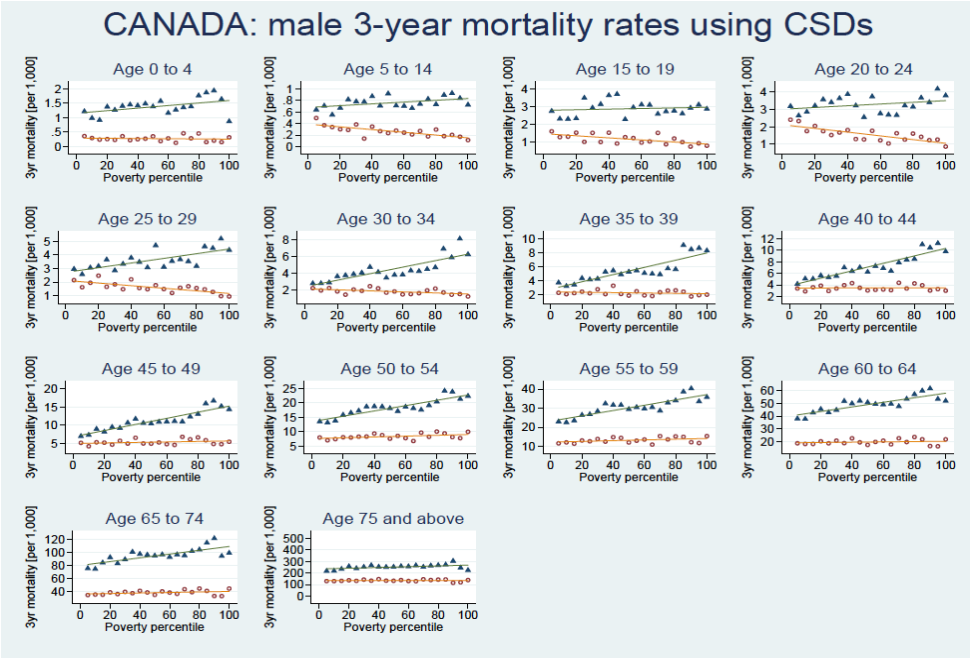
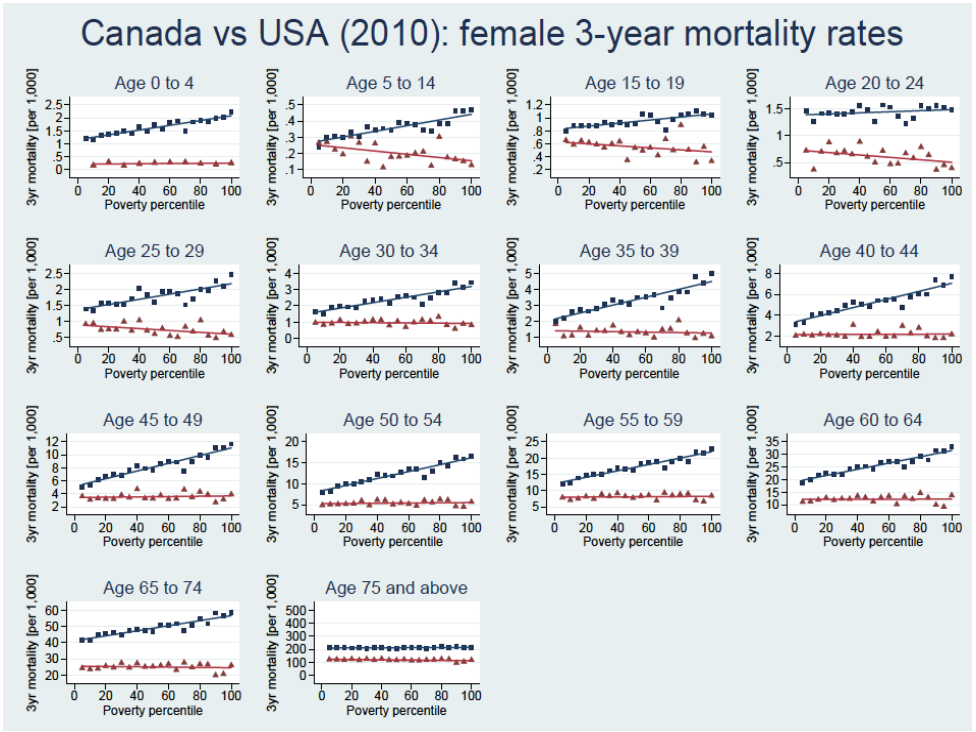


Evolution of mortality inequality in Canada, 1991-2011

Overall picture is surprisingly similar to the U.S.

Mortality has fallen for every group and profiles have become flatter, or even downward sloping (?)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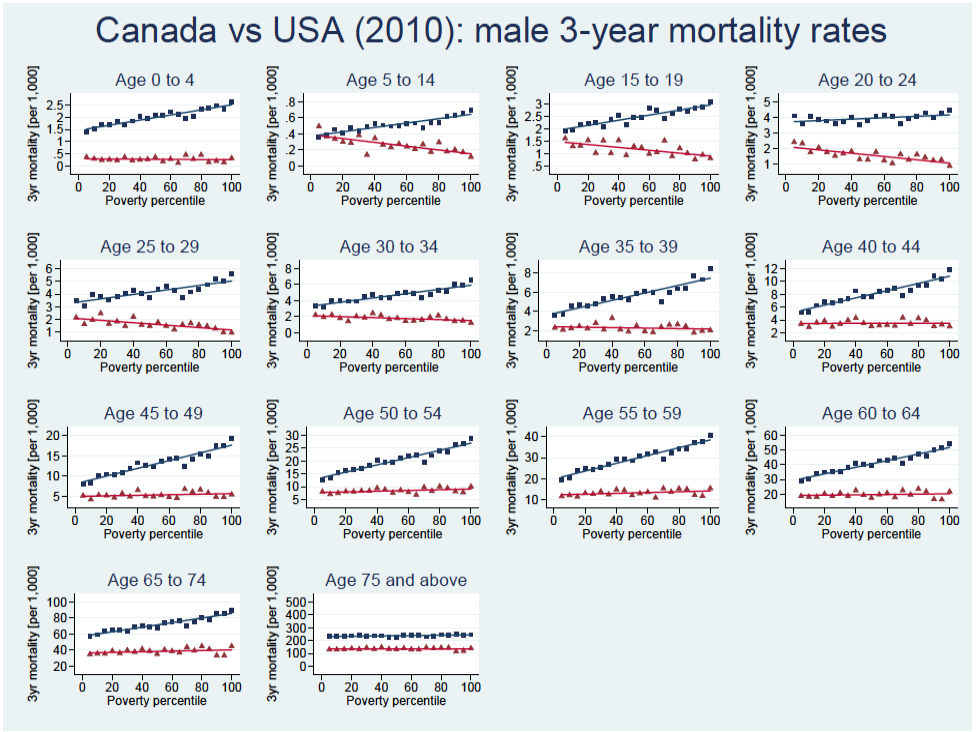
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Comments on Canada-US gap in 2010/2011

- Although mortality has fallen in both Canada and the U.S., it appears to have fallen faster in Canada with the result that gaps have opened up in the 75+ group and among young people in wealthy areas
- The U.S. now has higher mortality rates in these groups.
- Canadian profiles are remarkably flat and even downward sloping for younger age groups (??)

Conclusions

Canadian data is very preliminary

- need to check role of Aboriginal areas in driving results for low income areas,
- need to try using 2001 LICO rankings as a robustness check

Canadian mortality rates are consistently lower than U.S. rates in terms of levels and have fallen as U.S. rates have fallen – this might reflect the public health insurance system.

Larger factors may possibly be more important than institutional differences in health care in explaining trends.