

Session 2-A-1 Longevity 2021: What to Assume for the Future in the Wake of COVID-19?

2021 CCA Enrolled Actuaries Conference | May 5, 2021



Steve Goss, ASA, MAAA, Chief Actuary, US Social Security Administration

Our Agenda - questions to address:

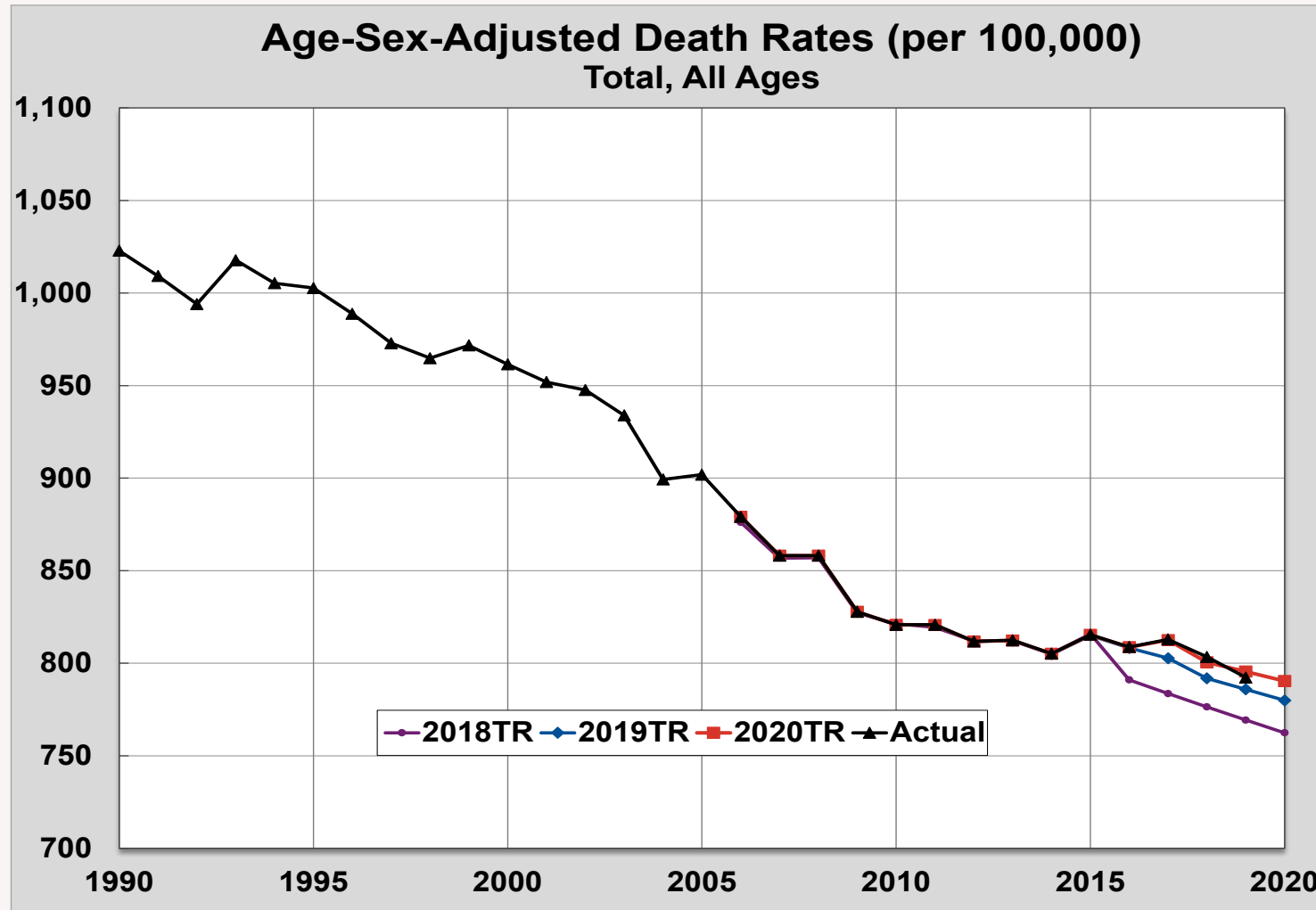
1. What are recent US mortality patterns (pre-COVID), and what has driven that?
2. Is our recent slowdown in mortality improvement reflected in other developed nations?
3. Is mortality improvement cyclical?
3a. Are there longer-term implications from COVID-19?
4. How do the experts project future improvement?
5. What are the implications of geography and lifestyle on mortality?
6. What are the key sources of mortality improvement and trends?

1

1. What are recent US mortality patterns (pre-COVID)?

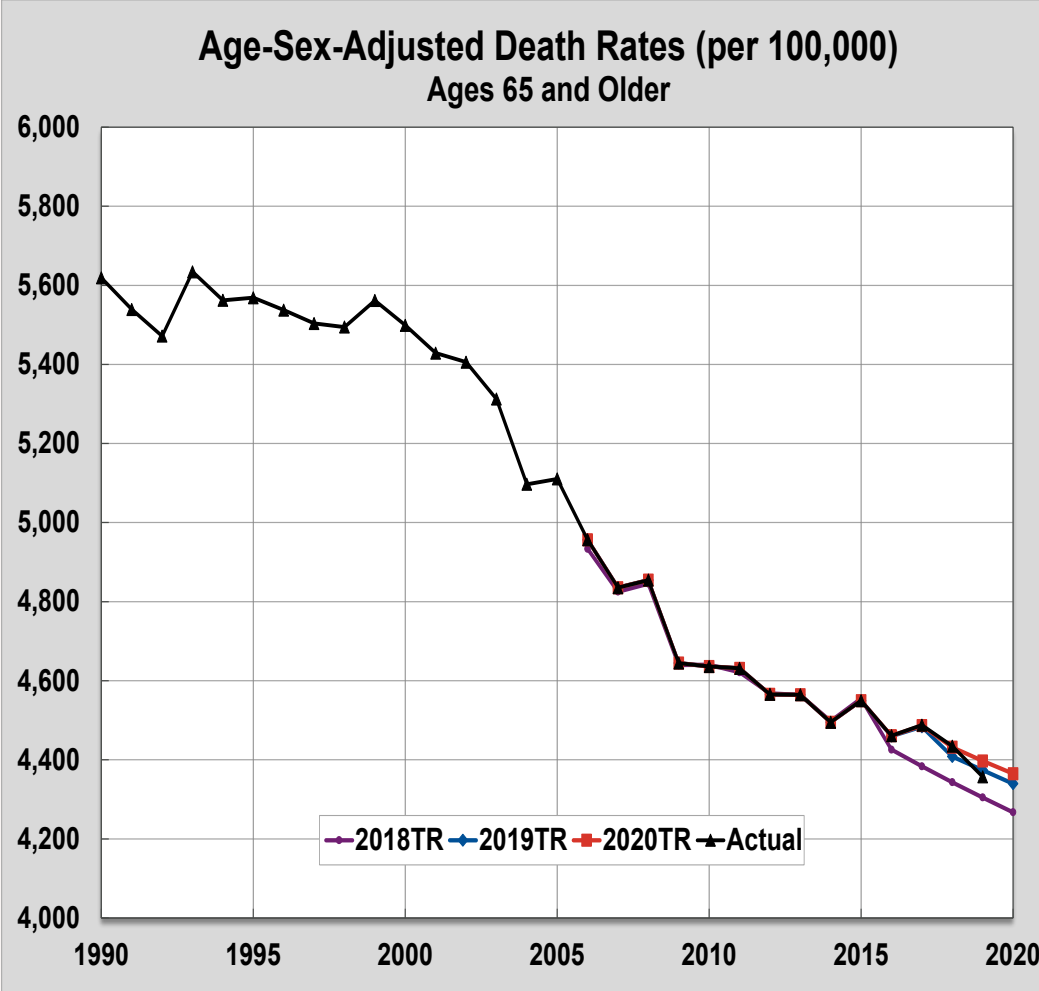
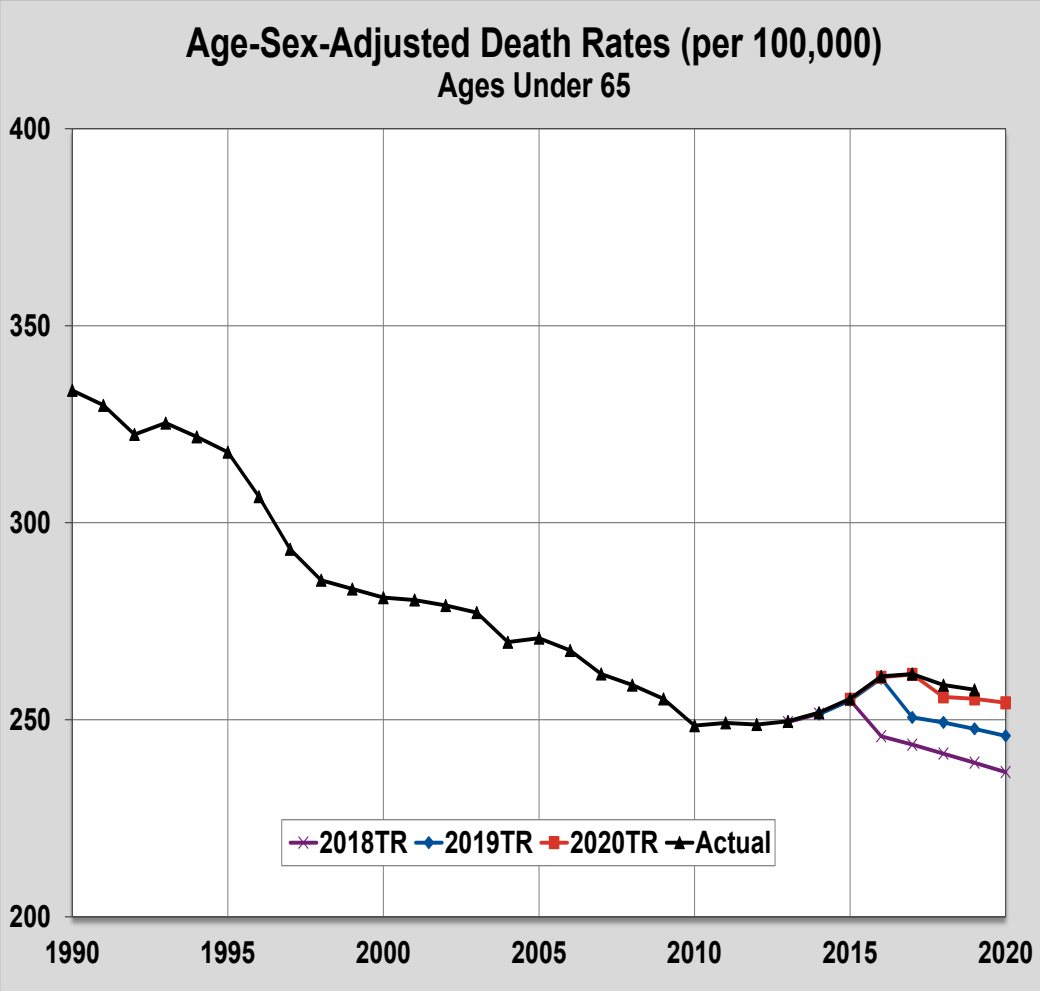
Recent U.S. Experience: All Ages

Reductions falling short of expectations since 2009



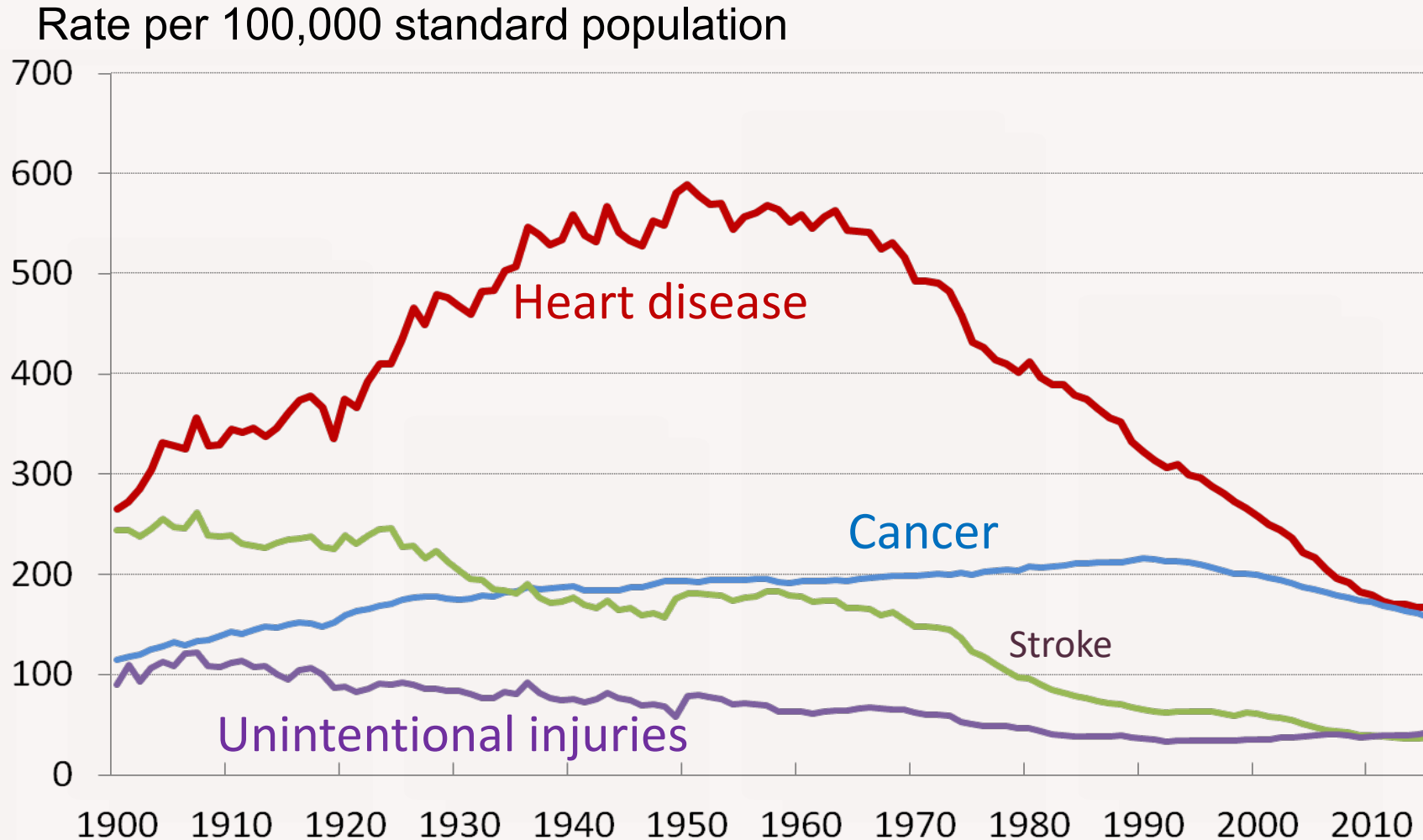
Experience Falls Short: Over and Under 65

Even with improvement over 65 since 2015



Age-Adjusted Death Rates (courtesy Robert Anderson, NCHS)

Strong Declines 1999-2009 for Heart and Stroke; Little Since 2009

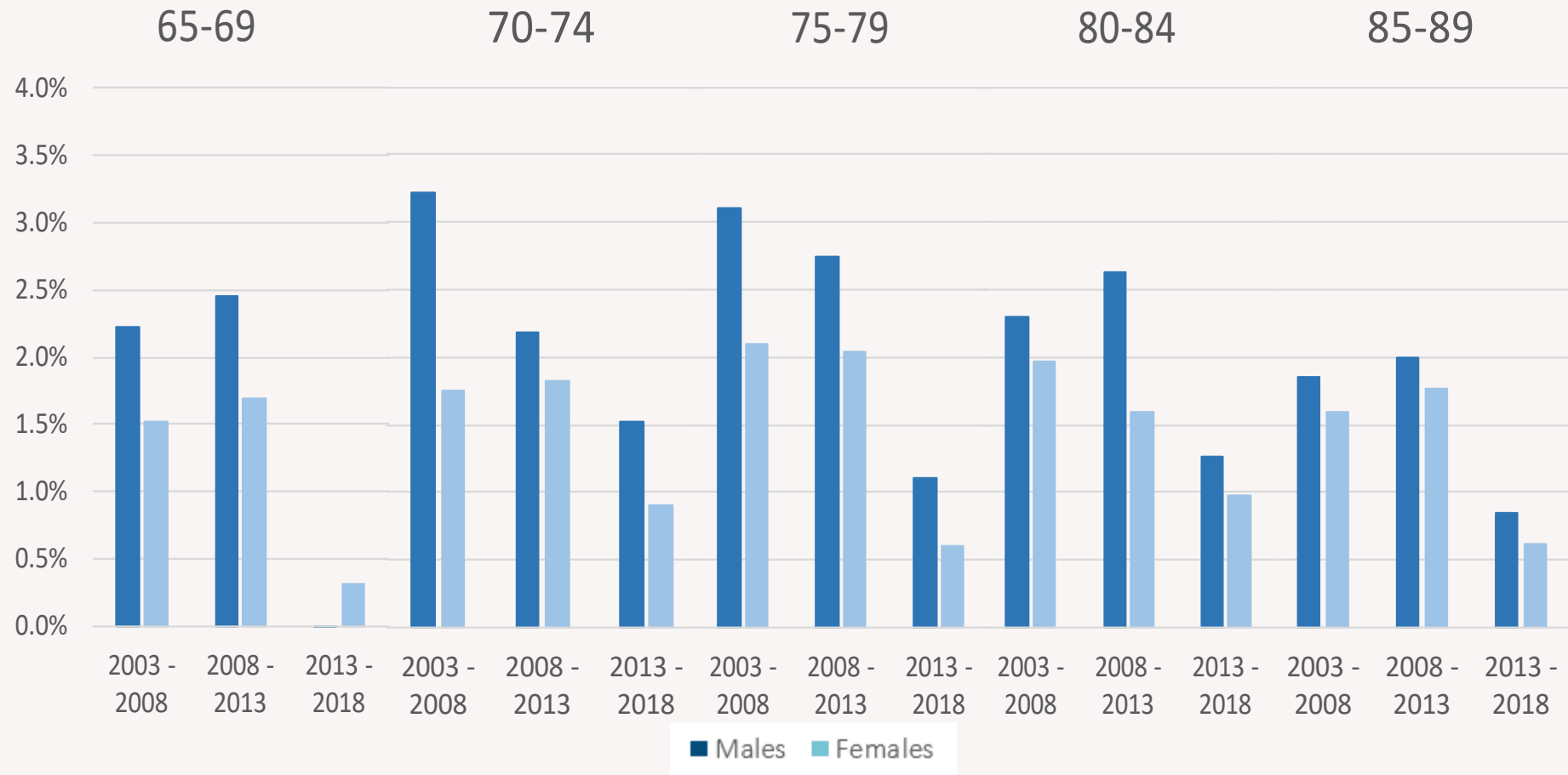


NOTE: Data prior to 1933 contain death-registration States only. Data for 2015 is provisional.

2 *Is our recent slowdown in mortality improvement reflected in other developed nations?*

Canada—Slowdown in Mortality Improvements

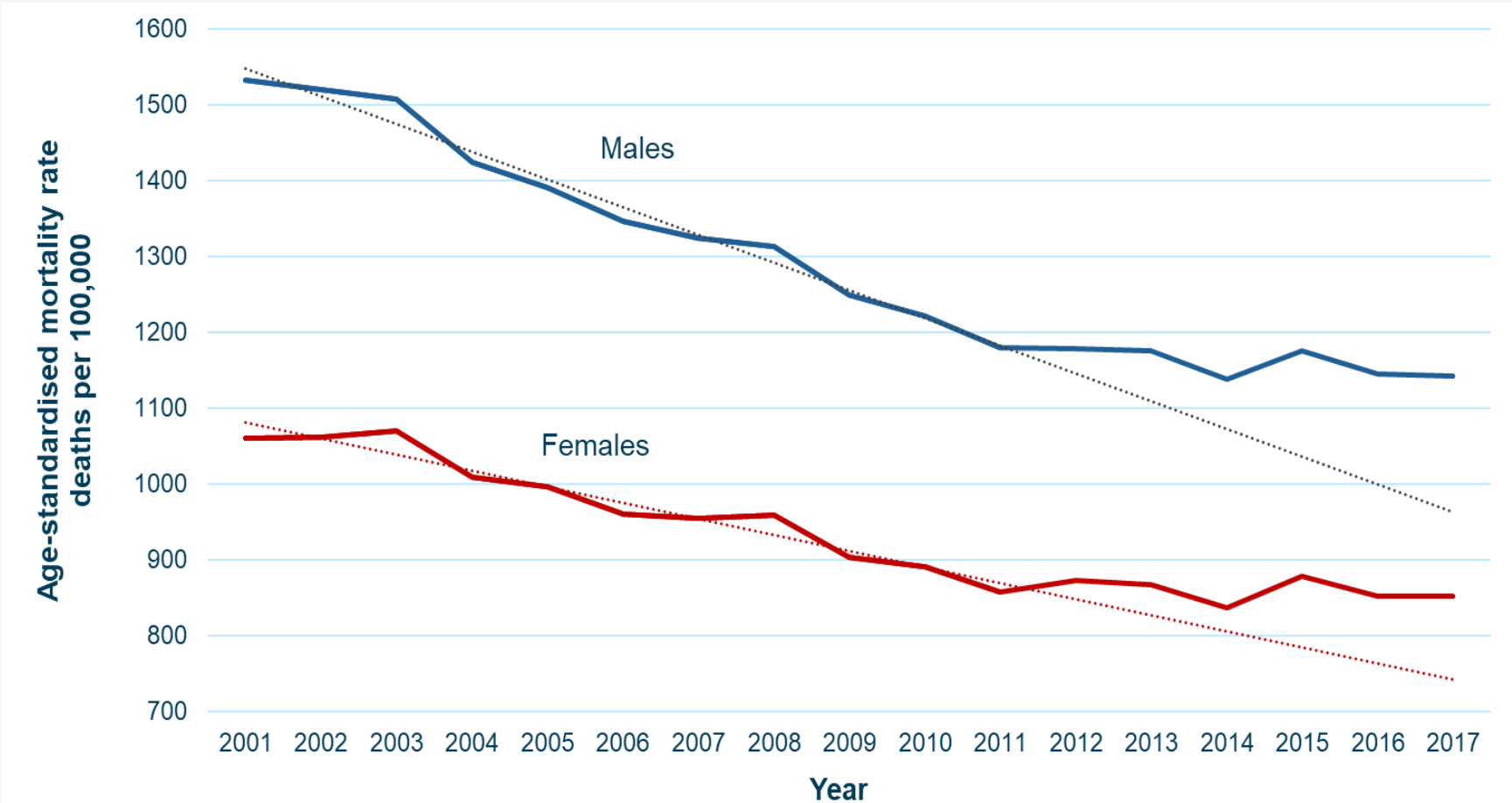
January 2020 Living to 100 Symposium: Assia Billig, Chief Actuary, CPP



Source: OAS Mortality Fact Sheet – to be published in January 2020

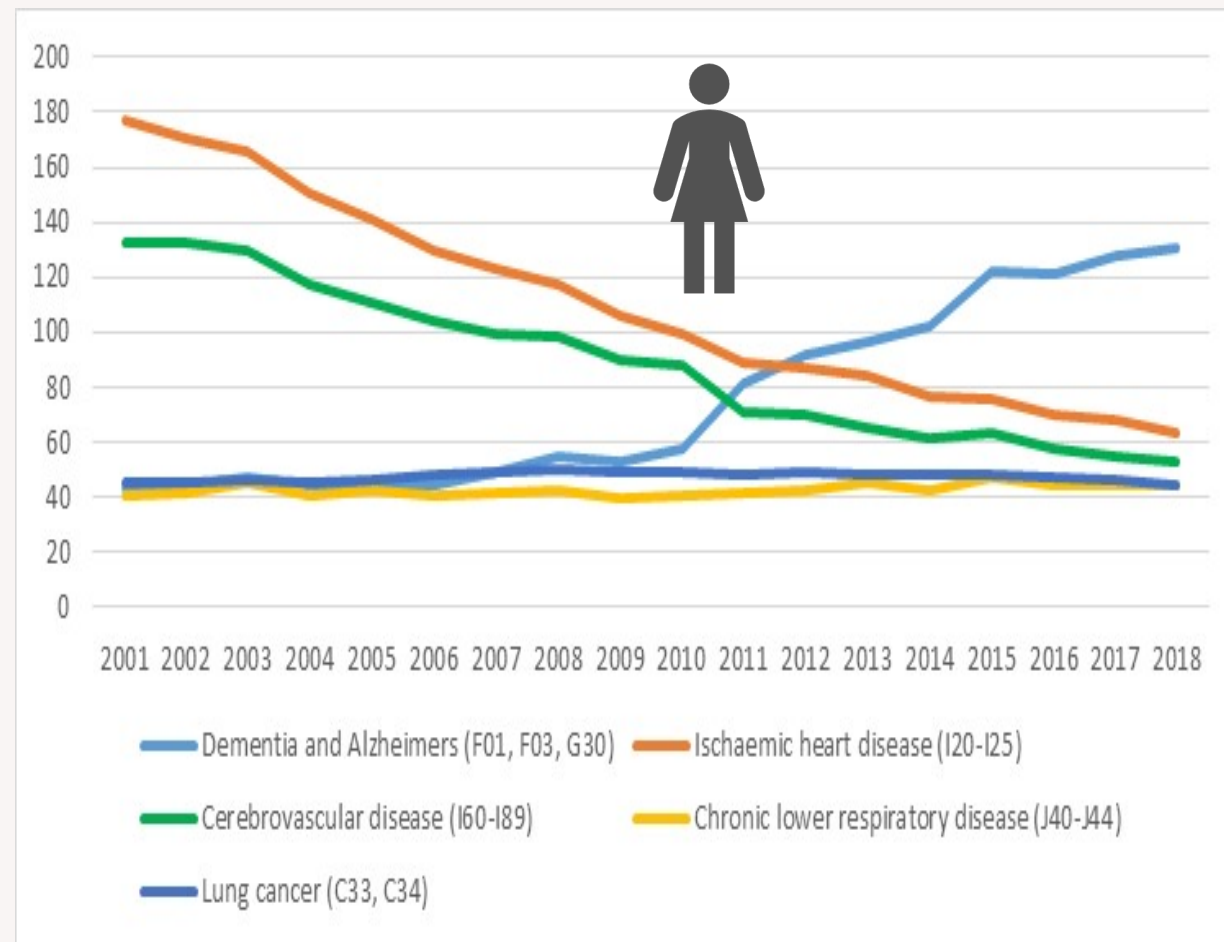
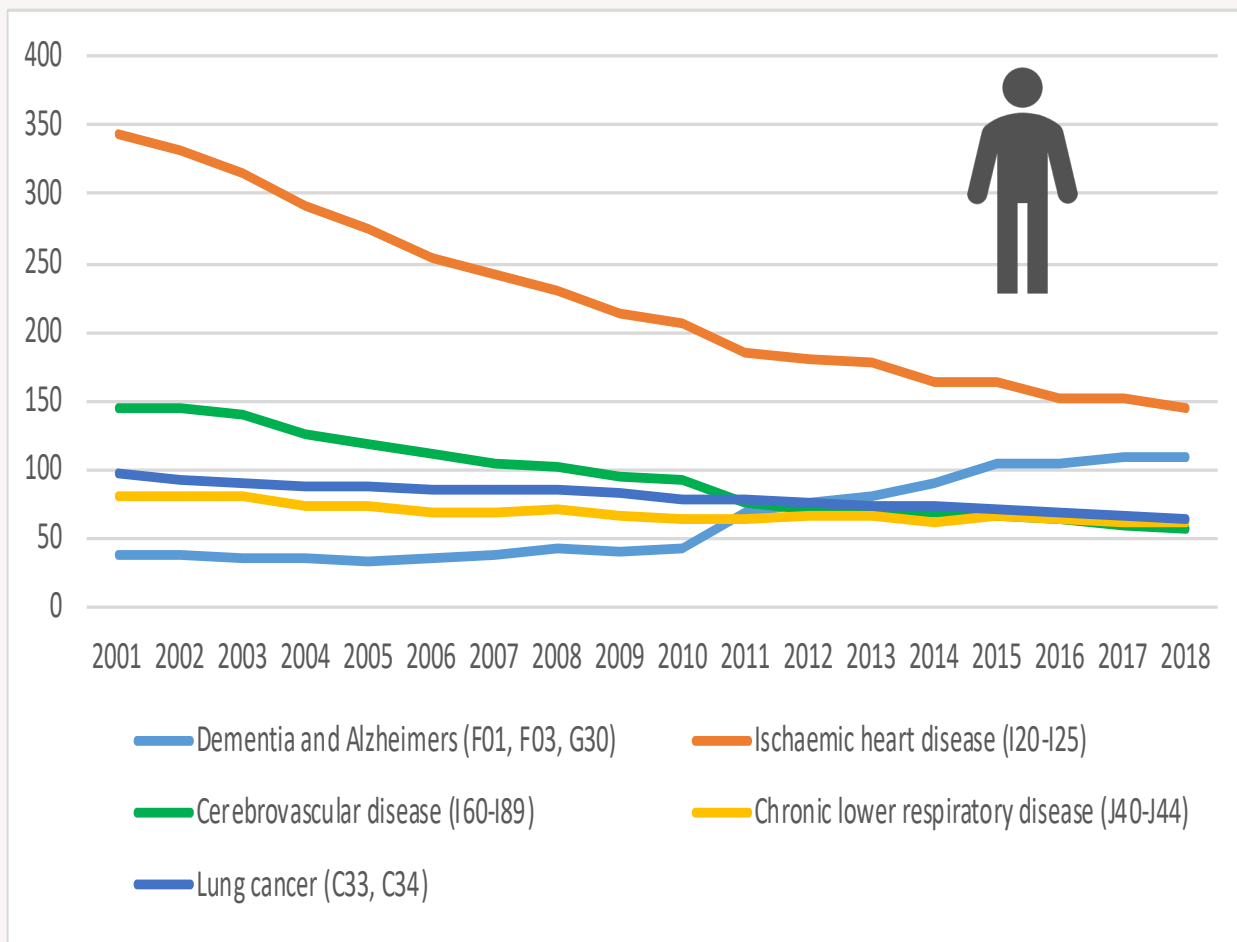
United Kingdom—Deceleration Since 2011

*January 2020 Living to 100 Symposium:
Adrian Gallop, UK Government Actuary's Department*



Age-Standardized Mortality Rates for Top Five Leading Causes of Death, 2001 to 2017, England & Wales

Note—we are looking at this carefully for the U.S.

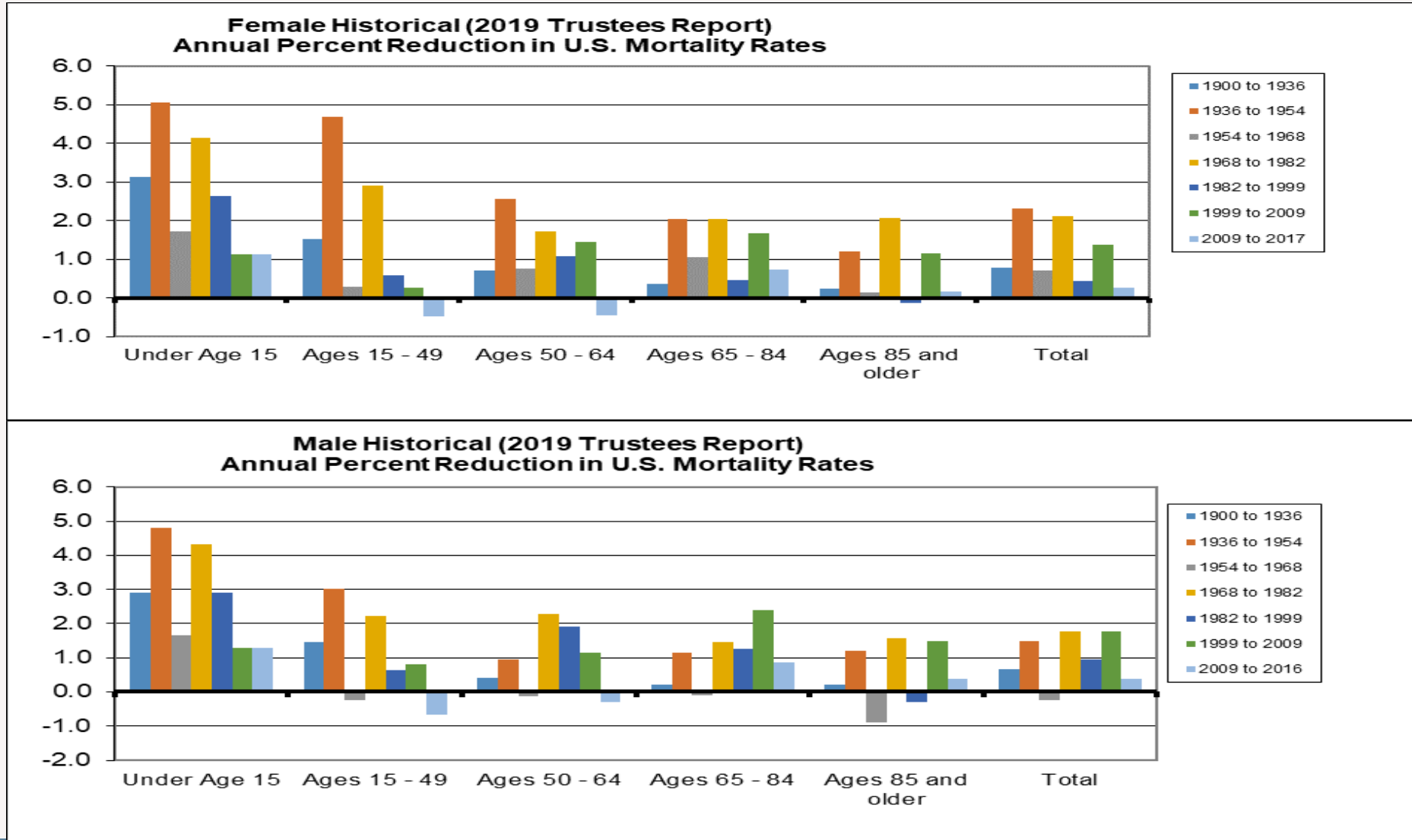


Courtesy Adrian Gallop, UK Government Actuary's Department

3 *Is mortality improvement cyclical?*

Mortality Decline Varies Over Time: On a Period Basis

Conditions: Antibiotics/economy 1936-54; Medicare/Medicaid 1968-82



Cohort Considerations?

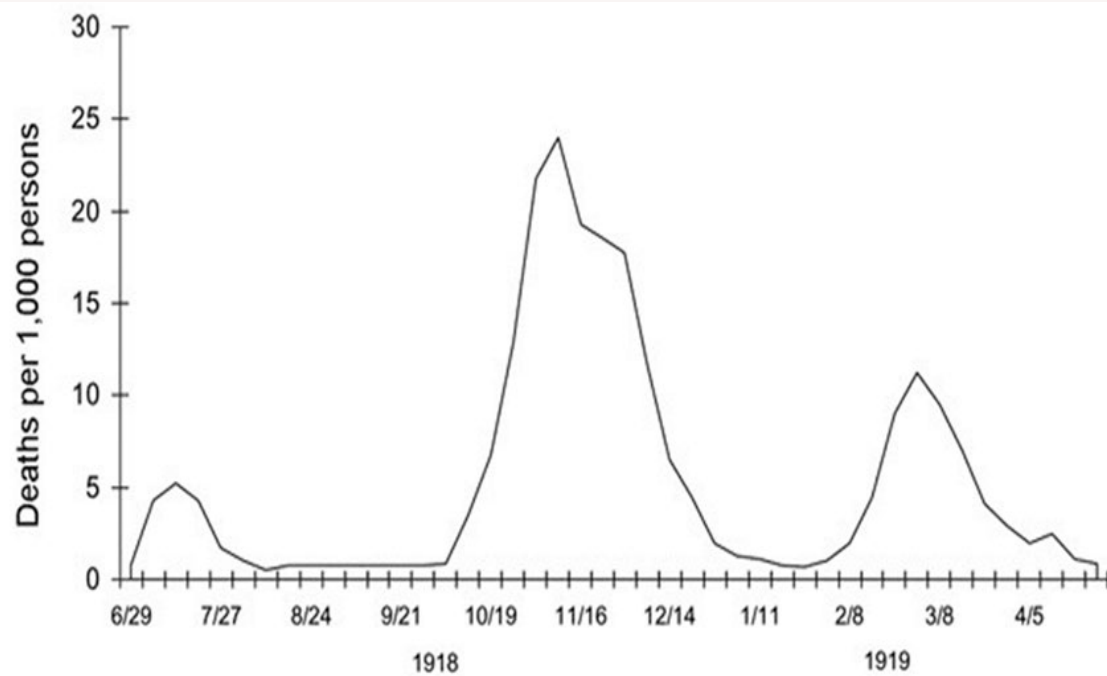
- Post-World War 2 births—special conditions:
 - Antibiotics when young; statins, etc. later
- What does change up to age x say above age x ?
 - If cohort is fundamentally healthier at x :
Then expect lower mortality over age x
 - If medical interventions have just reduced deaths through age x :
Then cohort mortality over age x could be worse, with increased numbers of impaired survivors
 - What does one cohort imply for the next cohort?
Further changes depend on conditions, not trend

3a

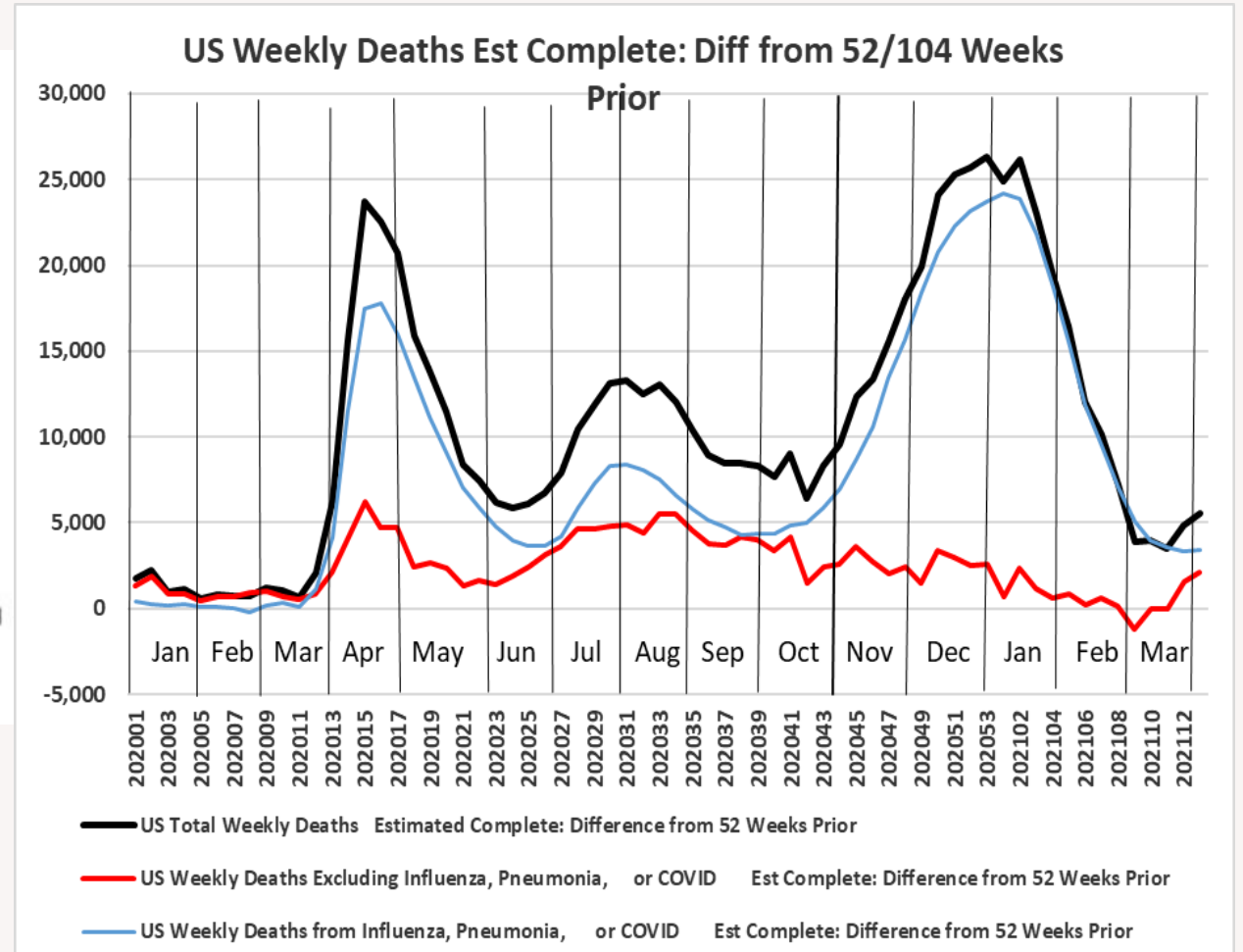
*Are there longer-term
implications from COVID-19?*

Pandemic Effects in the Near Term: *Only every 100 years?*

Figure 1. Death Rates of the Spanish Flu, June 1918 to May 1919



Source: The Spanish Flu and the Stock Market: The Pandemic of 1919 by Bryan Taylor | Feb 27, 2020 | Economics, Historical, Insights



COVID-19 Longer-Term Implications

- Raise death rates 16% in 2020, similar in 2021?
- Second coronavirus in 20 years
 - *Expect periodically in a now mobile world population?*
- Reduced life expectancy for affected cohorts
 - *But hopefully transient, not affecting future cohorts*
 - *Thus, possibly no implication for “trend rate” in mortality*
- But, if deaths are raised by 16% in 2 of every 20 years:
 - *Average LEVEL of mortality will be 1.6% above “trend”*

4 How do the experts project future improvement?

How Do Experts Project?

- Extrapolating past trends of:
 - Age setback?
 - Life expectancy at birth or other ages?
 - Improvement by cohort?
 - Mortality rate by age and sex?
 - Mortality rate by age, sex, and cause?
- Use a statistical extrapolation?
- Consider factors affecting mortality change?

Can Life Expectancy Rise Linearly?

- Requires accelerating rate of decline in mortality rates if retain age gradient
- LE most affected by lowest ages—only so much gain possible
- Is there an omega? “Squaring” the survival curve: see later slide

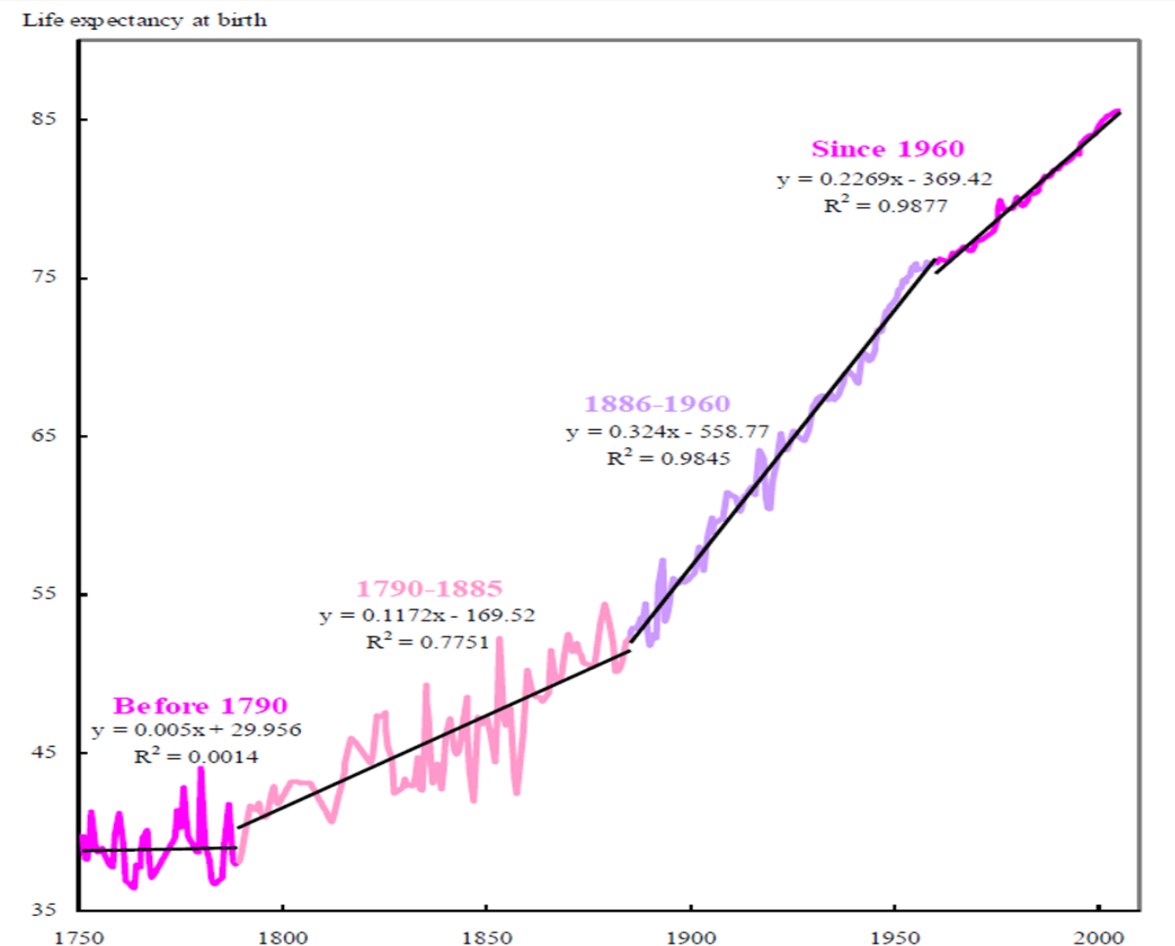


Figure 2. Maximum female life expectancy at birth since 1750 but excluding Norway (until 1866) and New Zealand
Source: Vallin and Meslé 2008

Extrapolation by Cohort

- **As stated earlier:**
 - What does change up to age x say above age x ?
 - What does one cohort imply for the next cohort?
- **Period effects from known conditions appear to be stronger—at least in the U.S.**

Extrapolation by Just Age and Sex

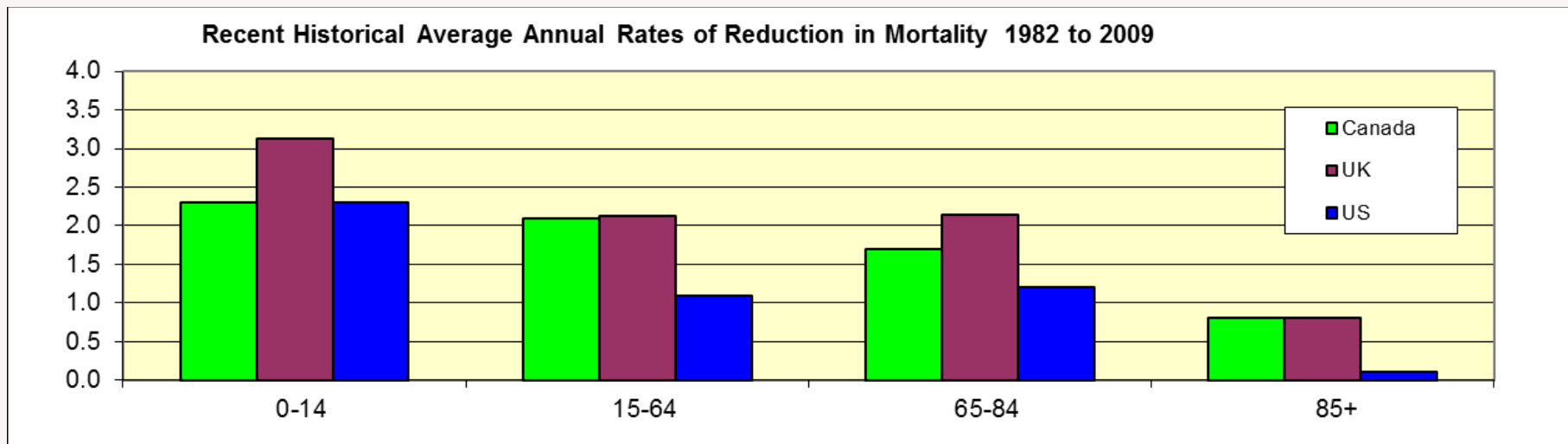
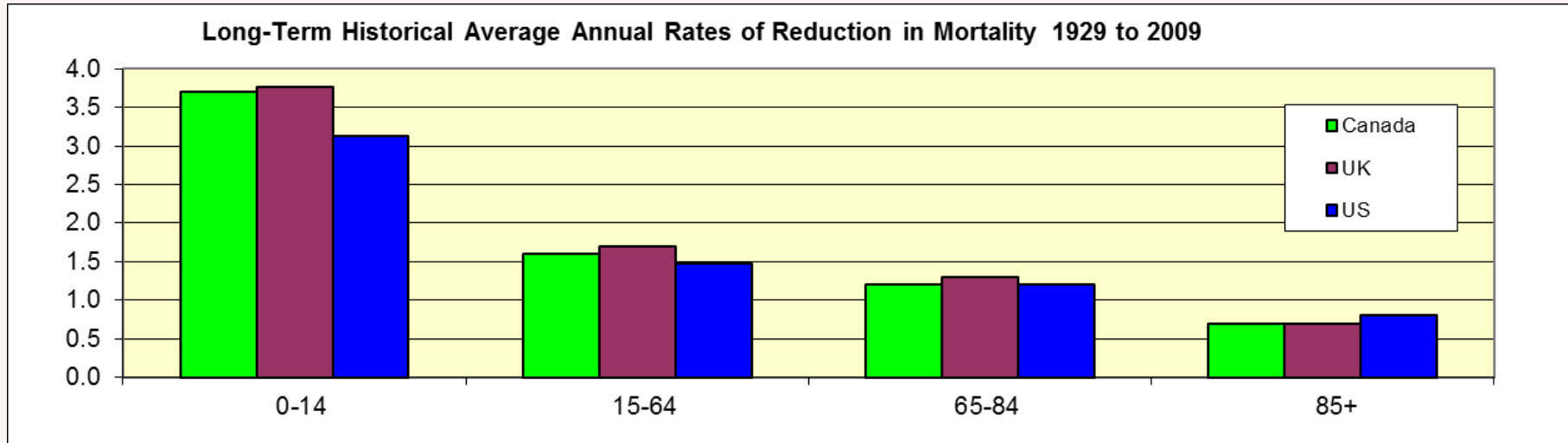
- Lee and Carter
- Assume future conditions replicate past
- Assume age gradient never changes
- No deceleration in mortality decline

Projections by Age, Sex, and Cause

- Scientific approach reflecting biology
 - Developed in consultation with medical experts
 - Johns Hopkins survey of medical researchers and clinicians came to very similar medium-term expectations—independently
- Allows change in age gradient
- Results in deceleration in mortality decline

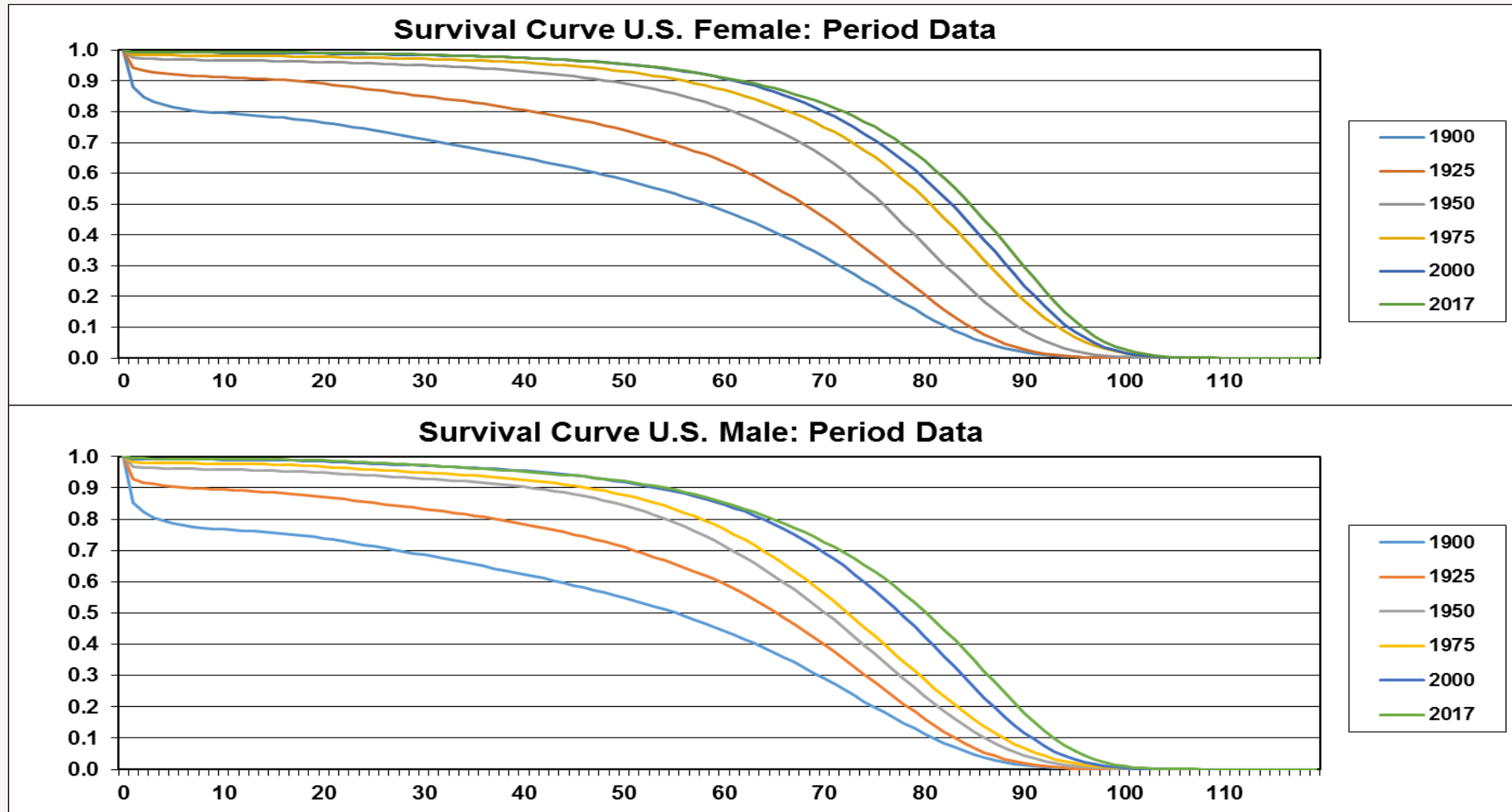
Variation by Age is Substantial

Age gradient in past reduction is clear



Is There an Omega?

It appears we are rectangularizing the survival curve



Death Rates Will Continue to Decline: *But How Fast and for Whom?*

- Must understand past and future conditions
 - Persistent historical “age gradient”
 - Avoid simple extrapolation of past periods
 - Cannot ignore changing conditions
 - “Limits” on longevity due to physiology
 - Latter half of 20th century was extraordinary
 - So deceleration seems likely
 - Cause-specific rates allow basis for assumptions
- Results: in the 1982 Trustees Report, we projected LE65 for 2013 to be 19.0; actual was 19.1

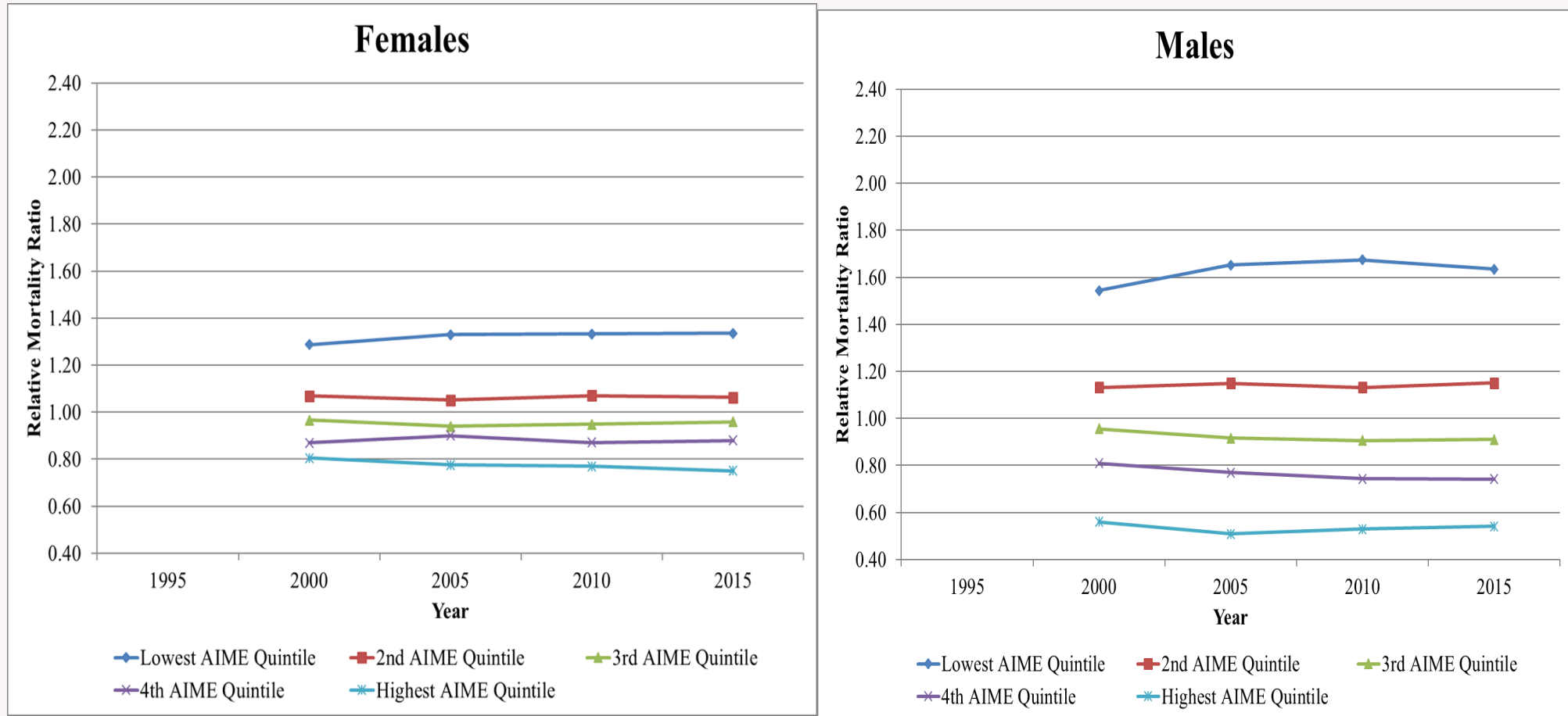
5 What are the implications of geography and lifestyle on mortality?

Geography/Lifestyle

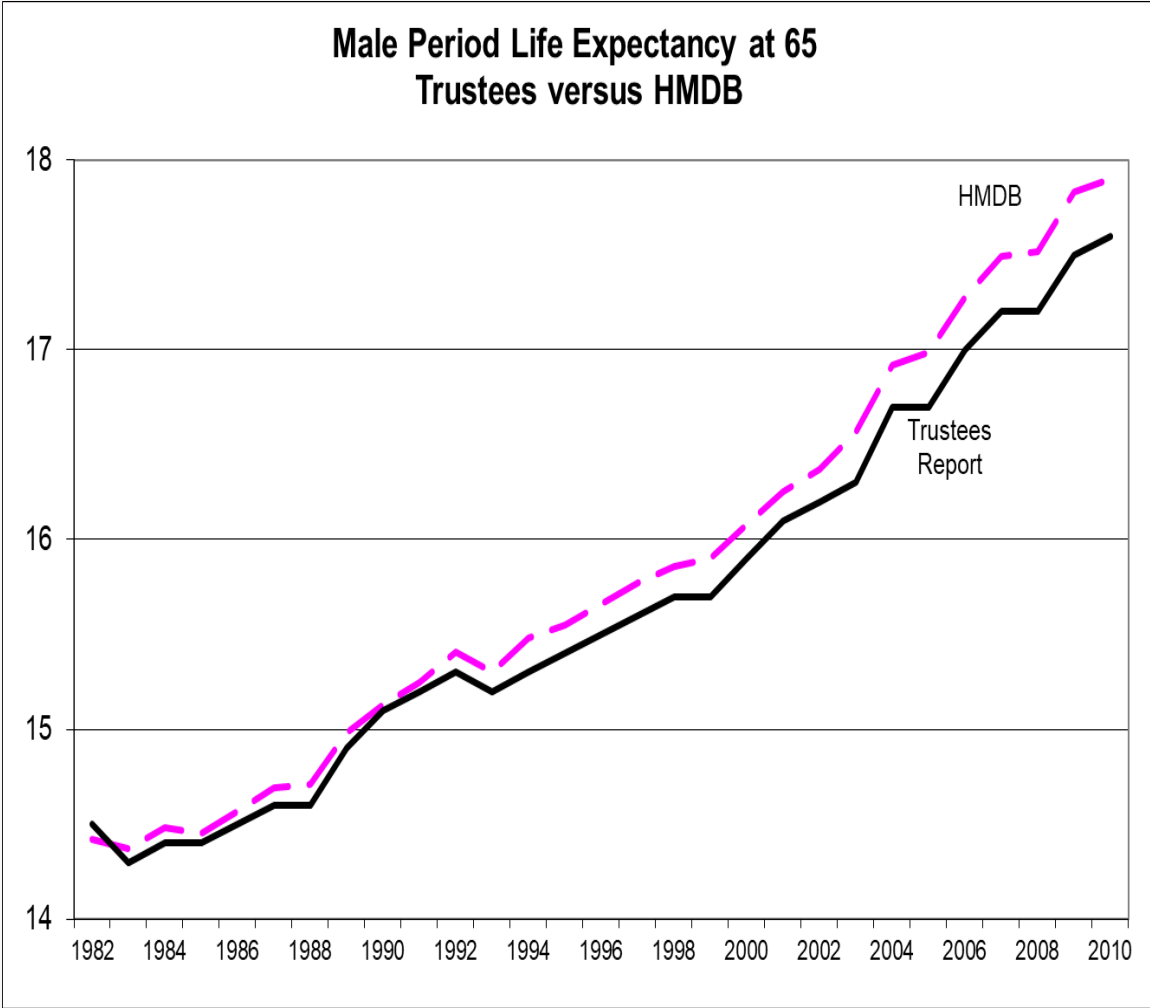
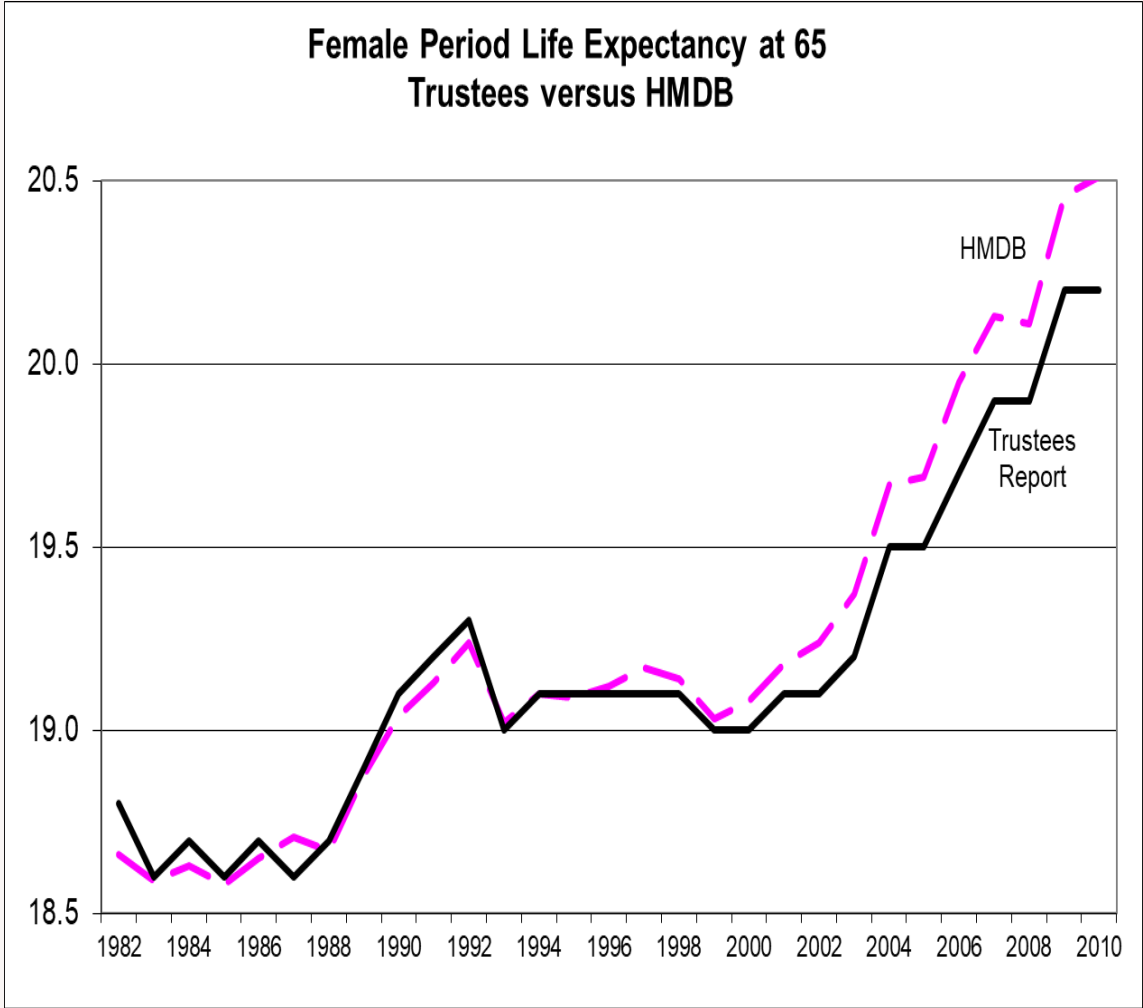
- Geography can be important due to mobility within and across countries, and different economic climate and customs
 - Immigration can distort data
- But for a specific employer or employment group, level of mortality may differ, even if trend rate does not

Mortality By Career-Average Earnings Level: Actuarial Study #124

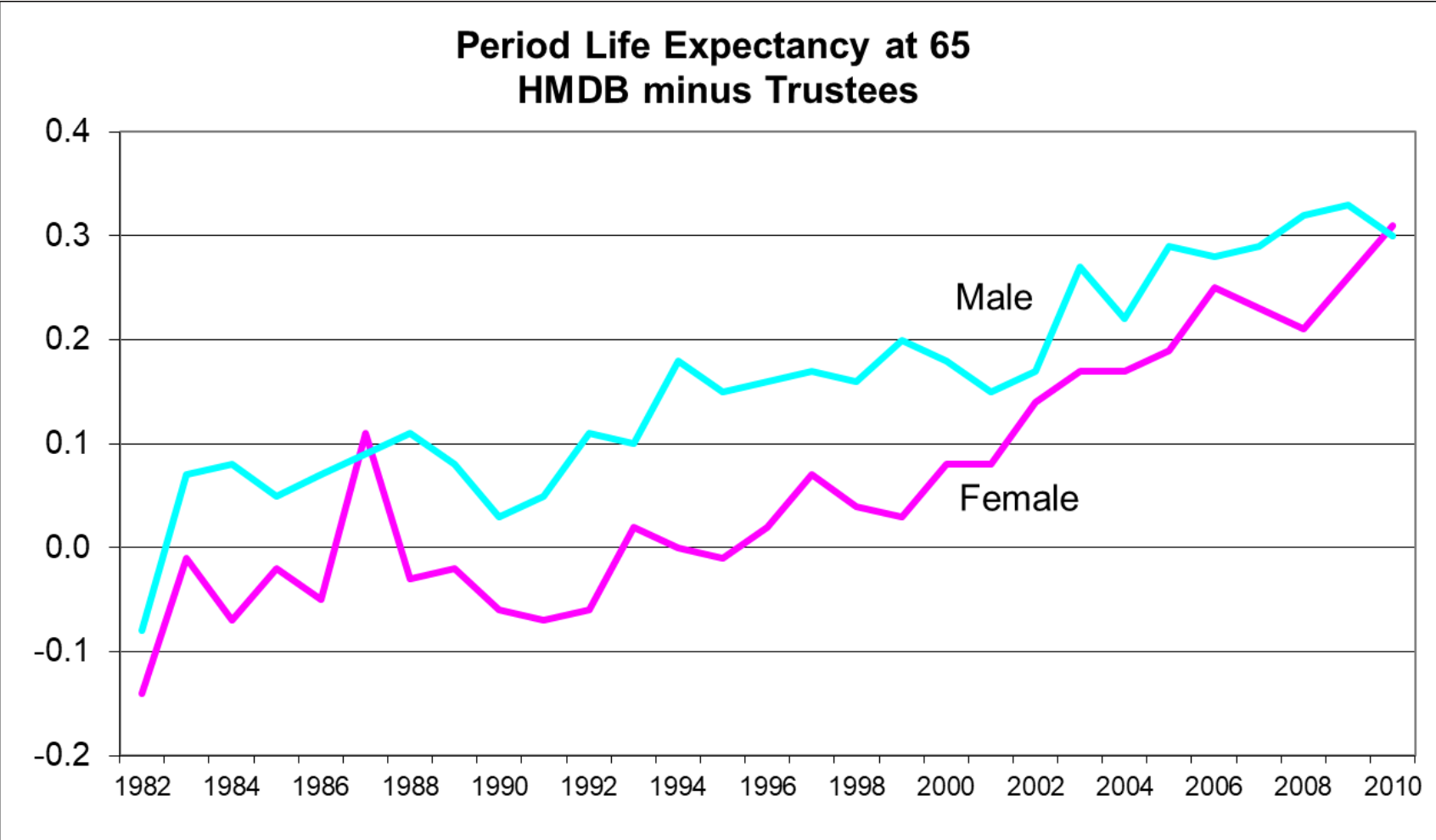
Age group 65-69 relative mortality ratios—not diverging?



Coverage and Data Source Matter: LE65 increases less for SSA/Medicare Population than HMD!



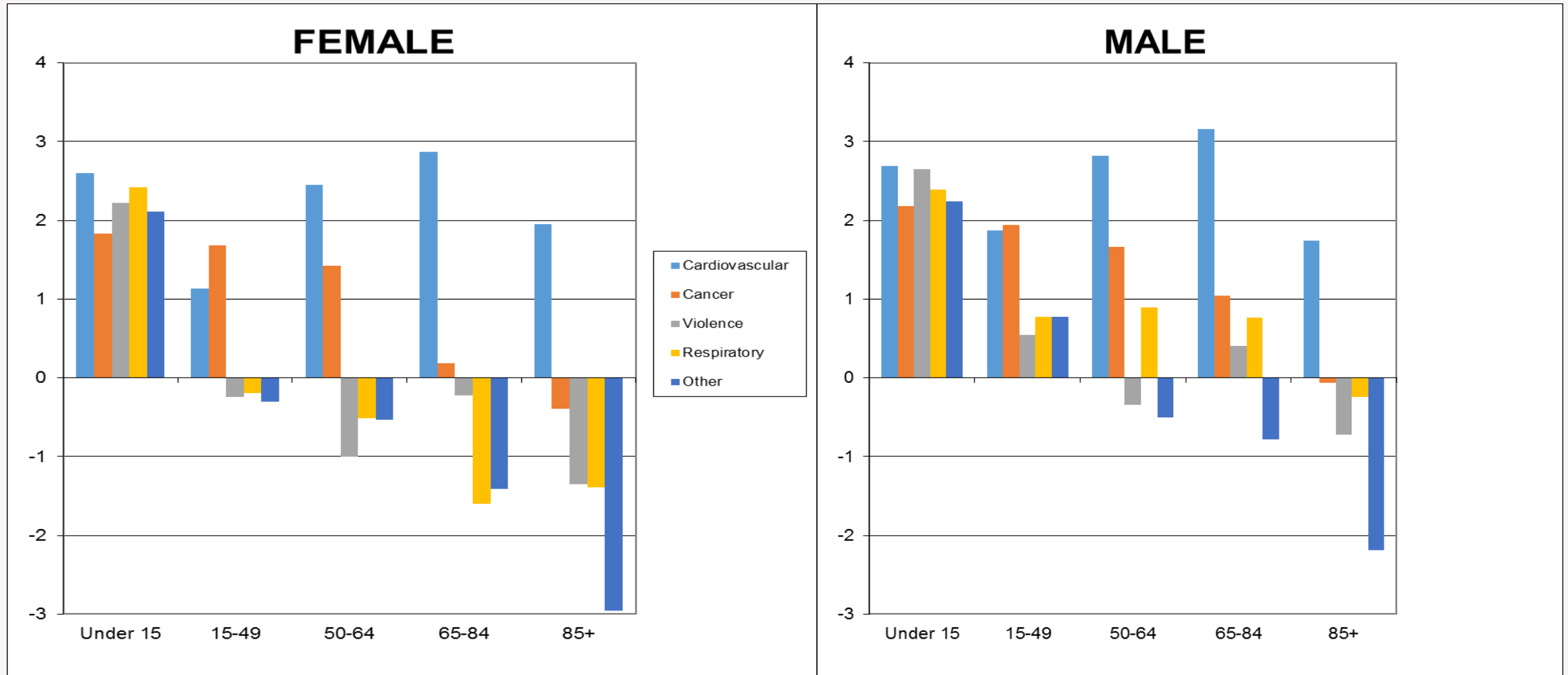
Experience Data Must be Consistent with Plan Coverage: Trustees Data have consistent deaths and exposure, and exclude undocumented (non-covered) population



6 What are the key sources of mortality improvement and trends?

Mortality Decline by Cause of Death:

Rate of change from 1979 to 2017



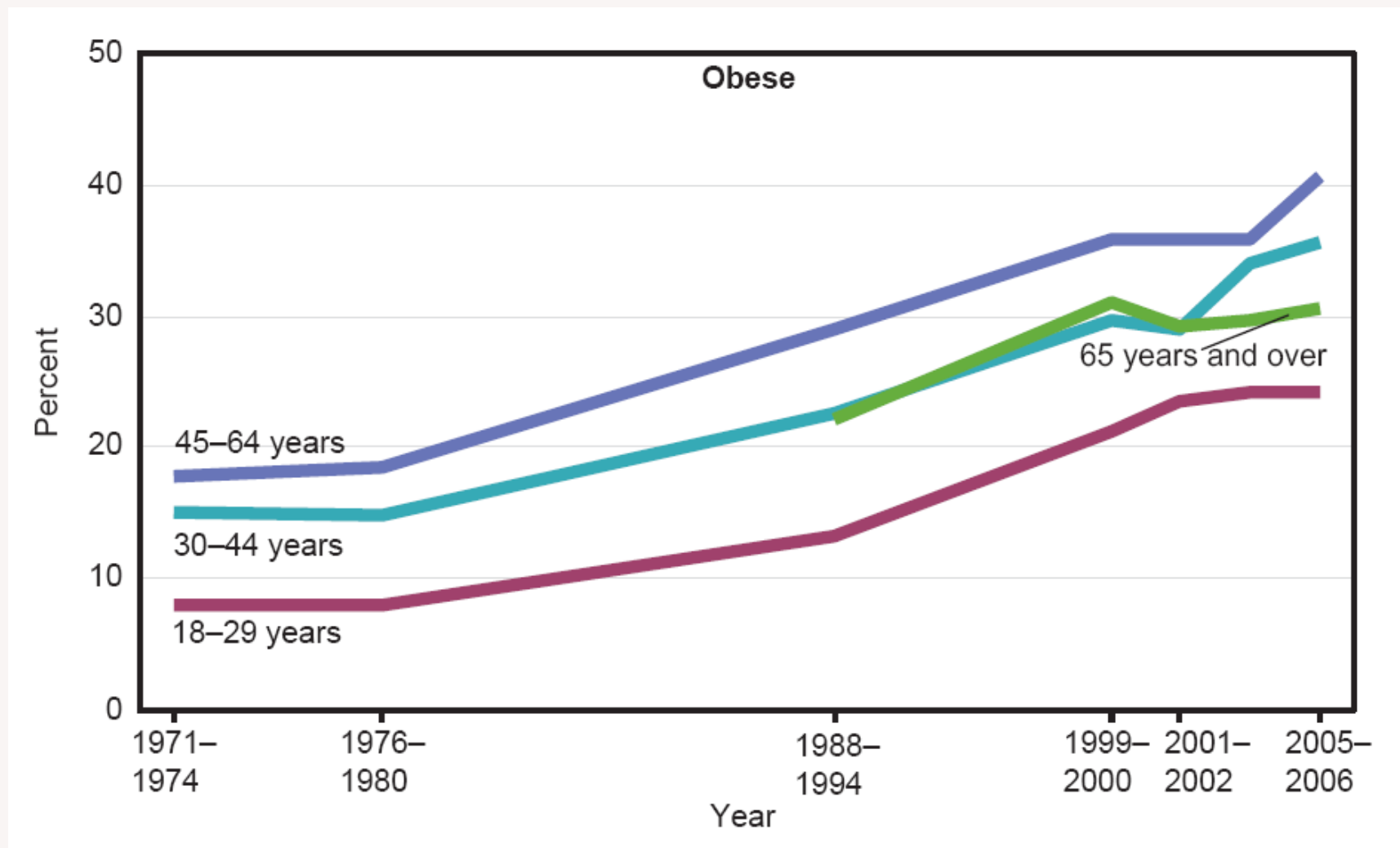
How Will Conditions/Trends Change?

- Cardiovascular and smoking—much left?
 - How about: Vaping? Climate effects?
- Obesity—sedentary lifestyle
- Health spending—must decelerate
 - Advances help only if they apply to all
- Changing causes
 - Dementia as seen recently in England
 - Despair (Case and Deaton)

Trends in Obesity: US 1971-2006

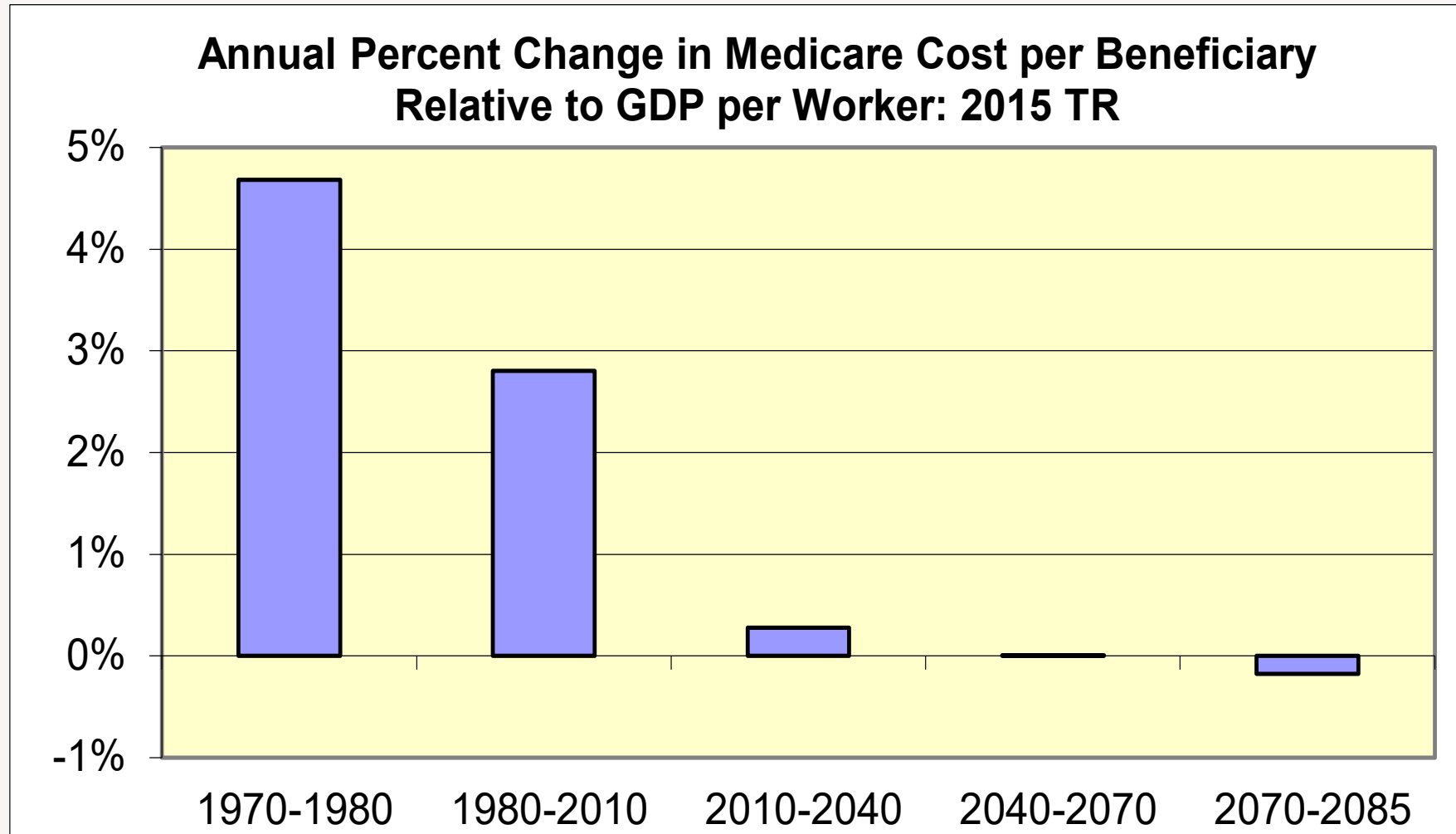
*Sam Preston 2010—must consider **cumulative** effects*

Increasing duration of obesity for aged in future

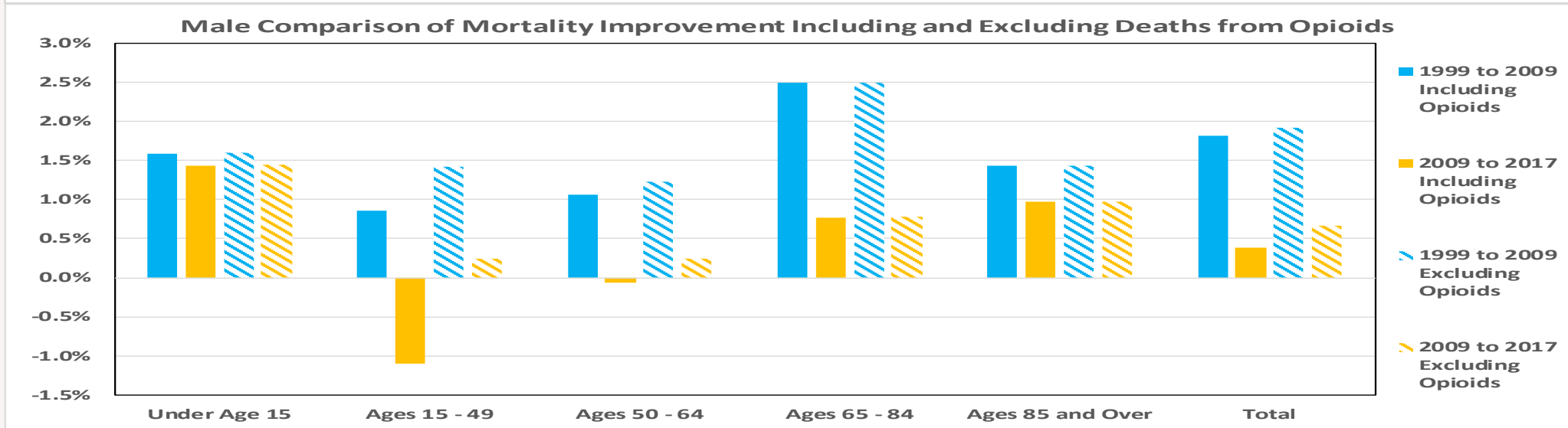
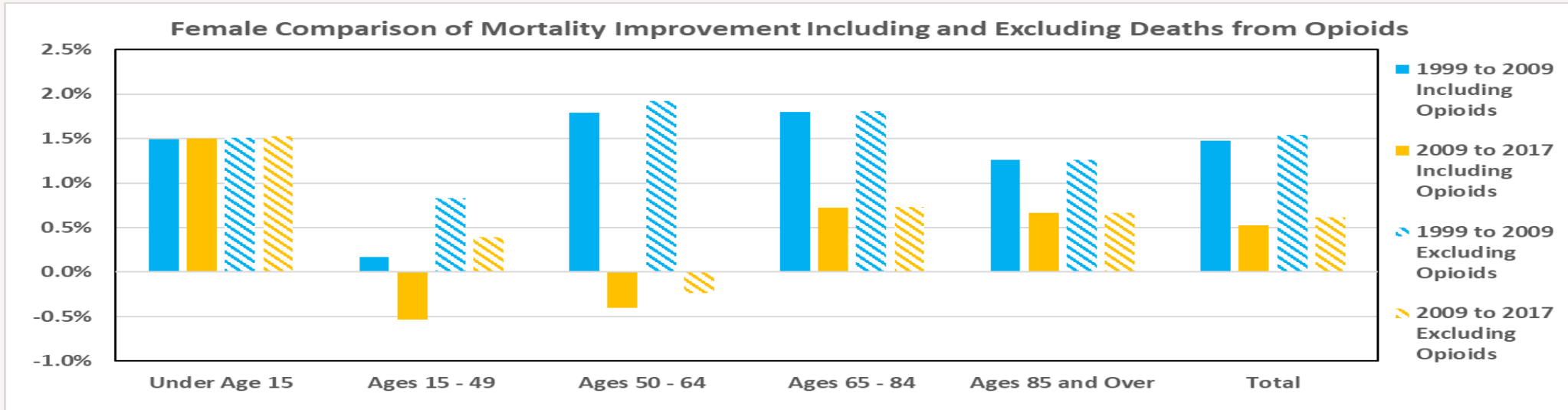


Health Spending Cannot Continue to Rise at Historical Rates—Effects on Mortality?

Note Trustees' deceleration



Opioids? Affected Age 15-64 Mortality Decline Since 1999, but Not the Deceleration Since 2009



For More Information from SSA

<http://www.ssa.gov/oact/>

- ◆ Documentation of Trustees Report data & assumptions
https://www.ssa.gov/oact/TR/2020/2020_Long-Range_Demographic_Assumptions.pdf
- ◆ Historical and projected mortality rates
<https://www.ssa.gov/oact/HistEst/DeathHome.html>
- ◆ Annual Trustees Reports
<https://www.ssa.gov/oact/TR/index.html>
- ◆ Actuarial Notes and Studies
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Projecting Mortality *Followup Discussion*

Steve Goss, Chief Actuary
US Social Security Administration

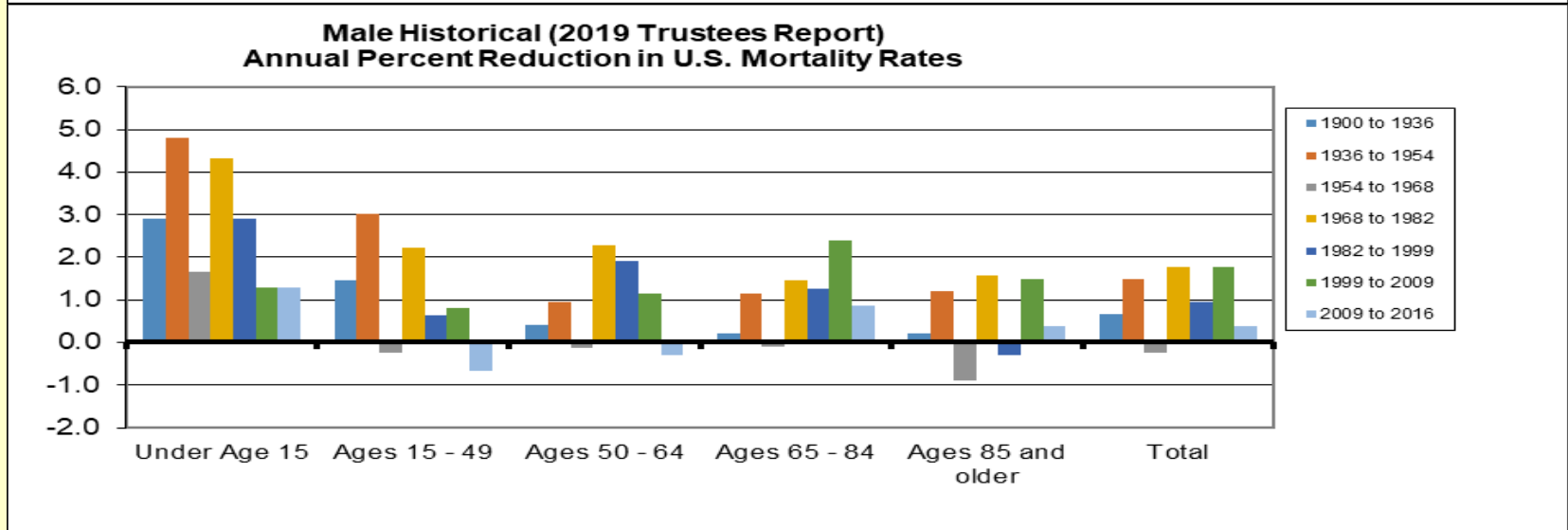
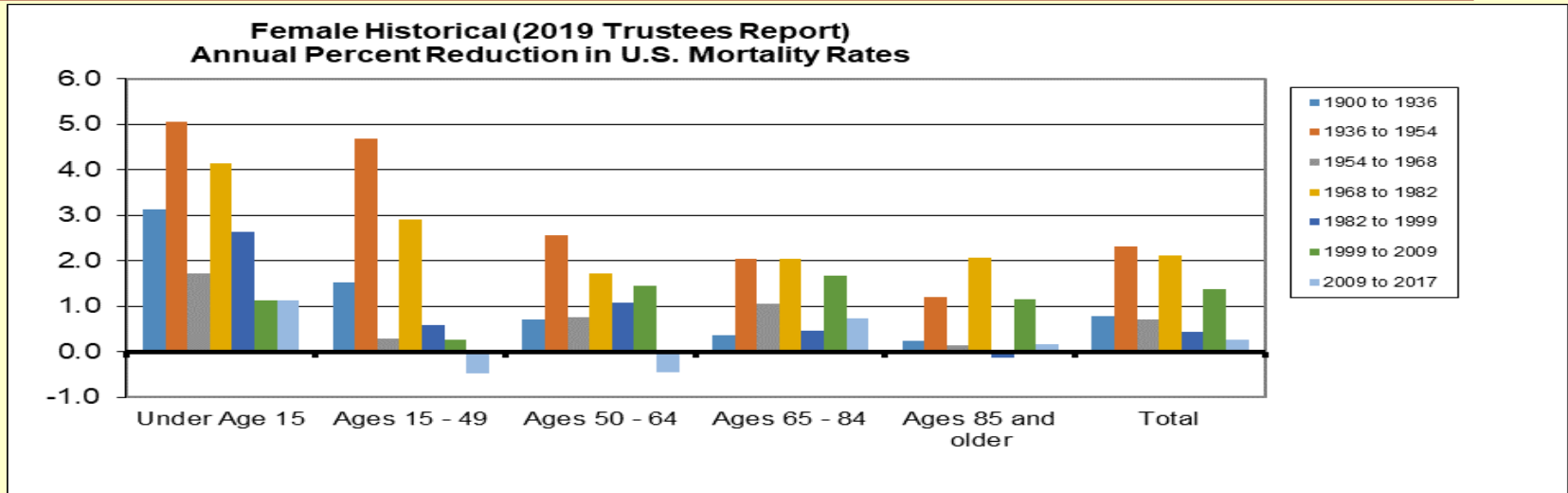
2021 Enrolled Actuaries Conference *Followup*

Session 2-A-1

June 2, 2021

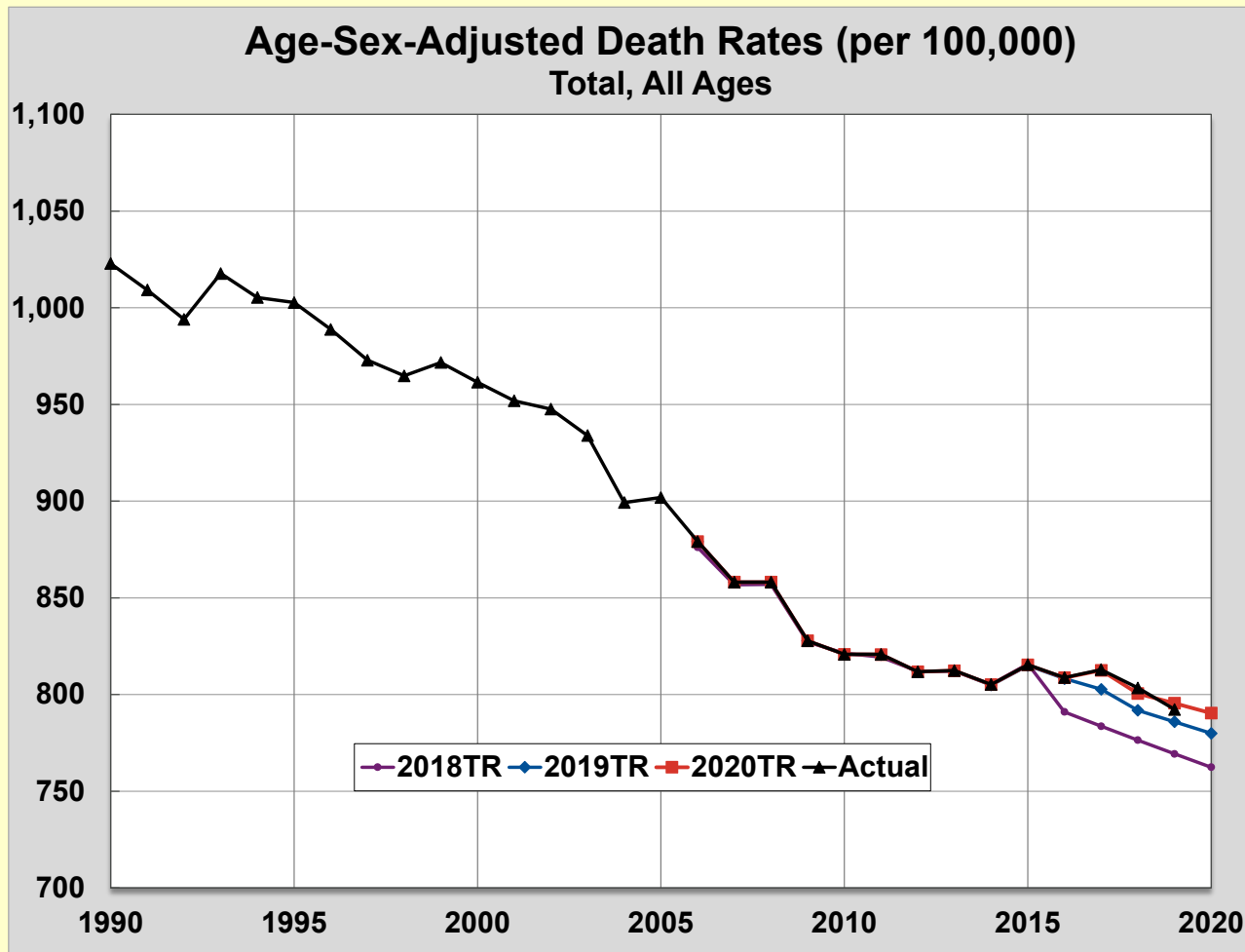
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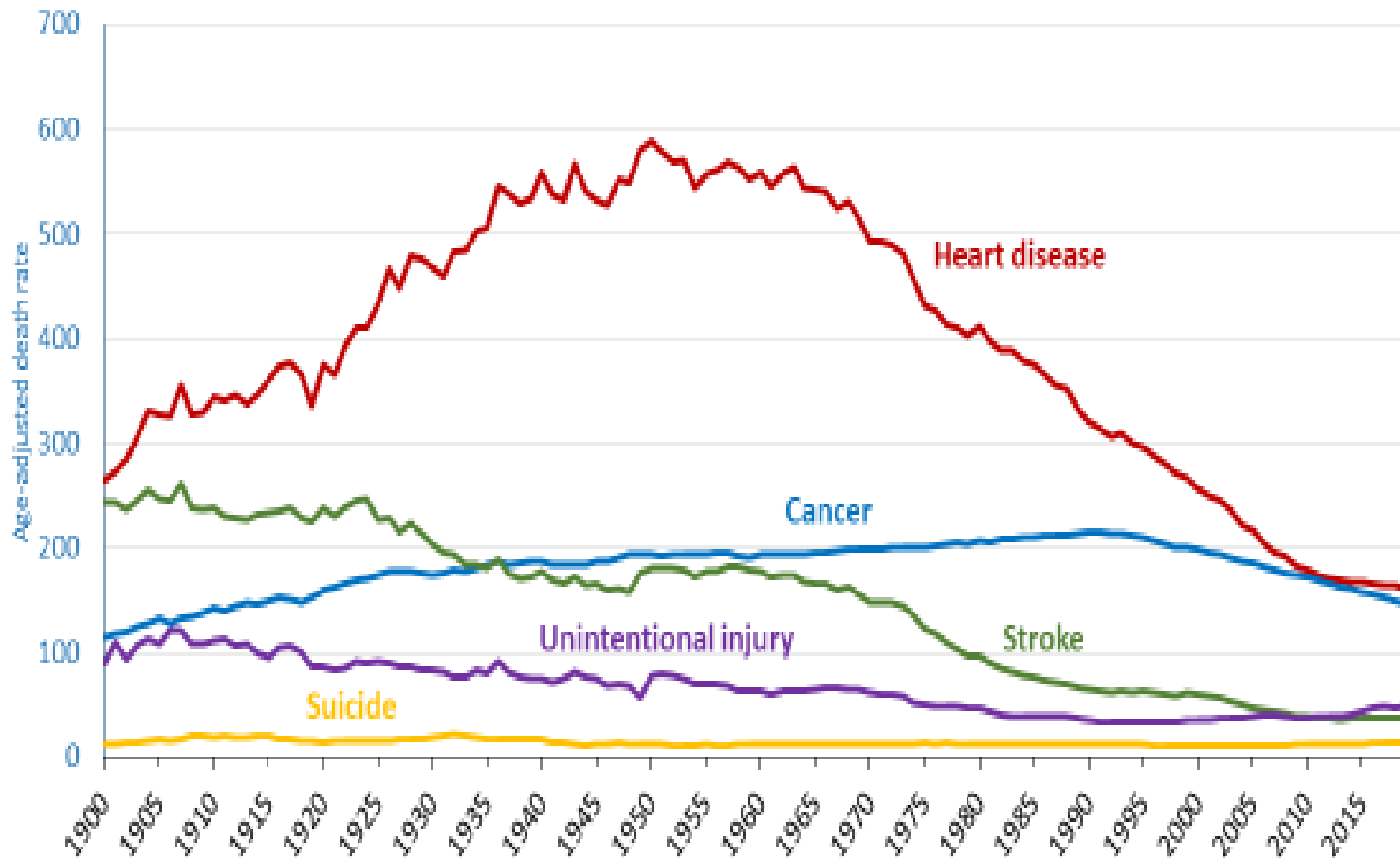
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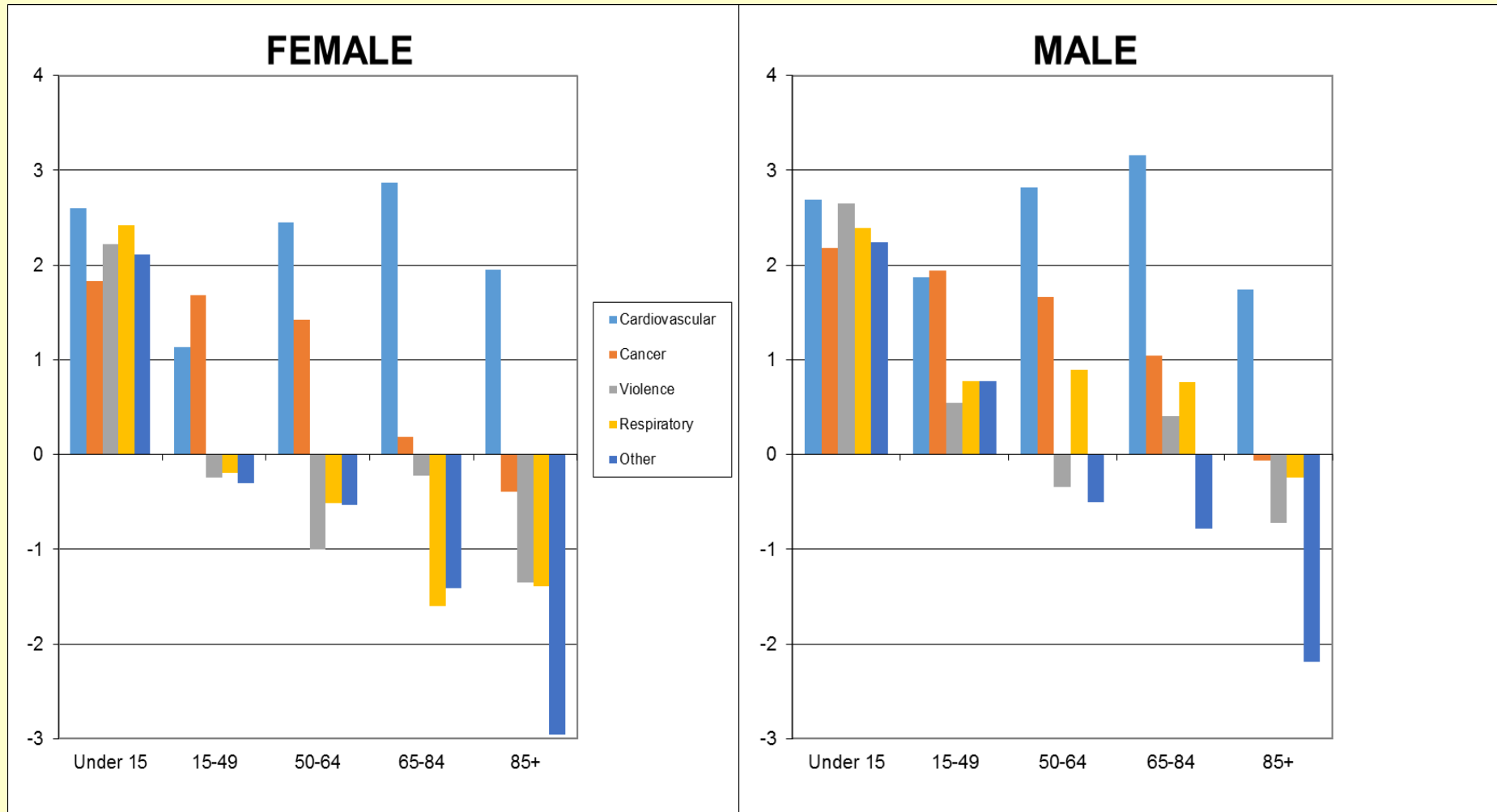
Age-adjusted death rates due to selected leading causes of deaths: U.S., 1900-2019

Courtesy Bob Anderson CDC



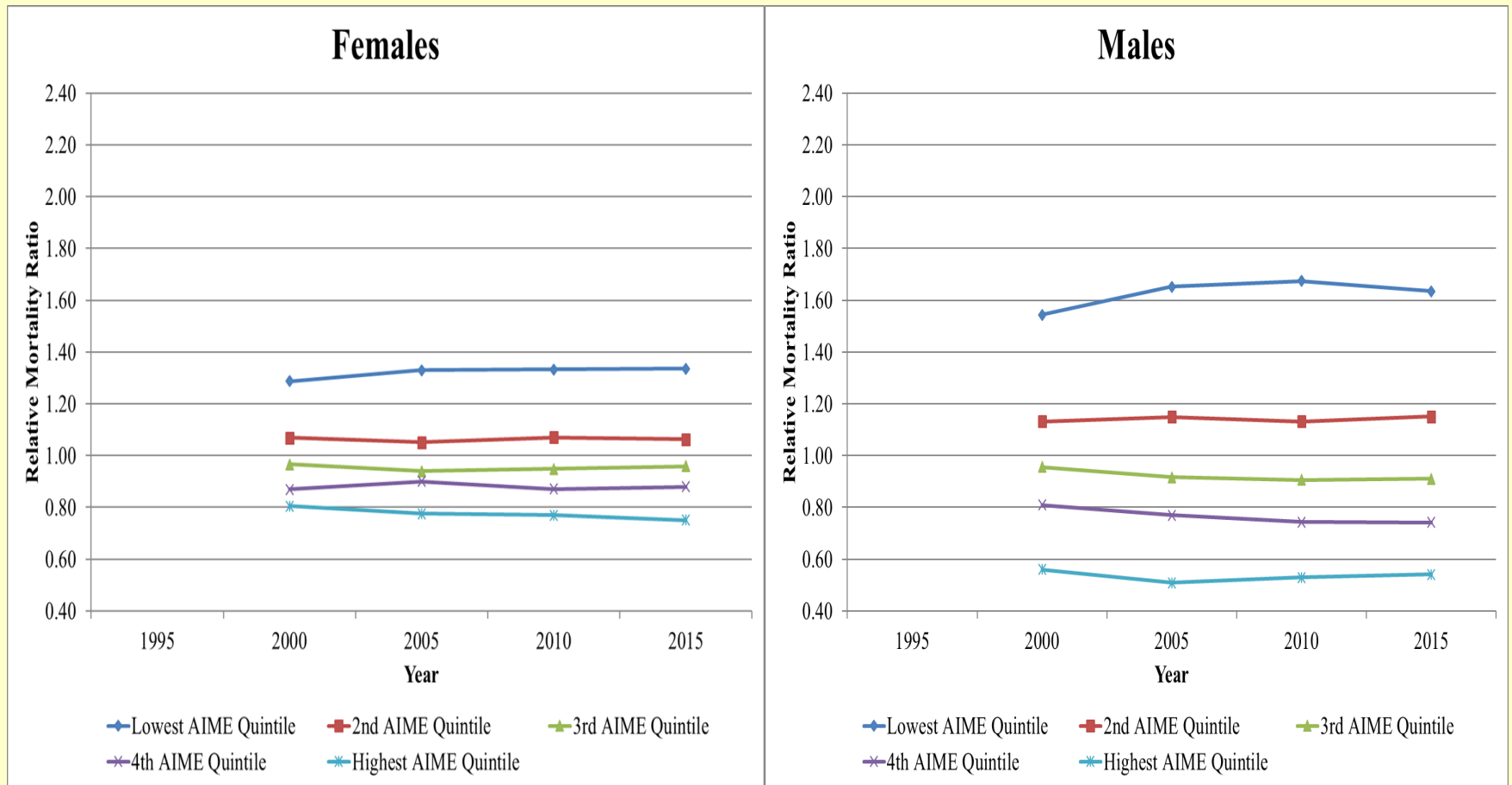
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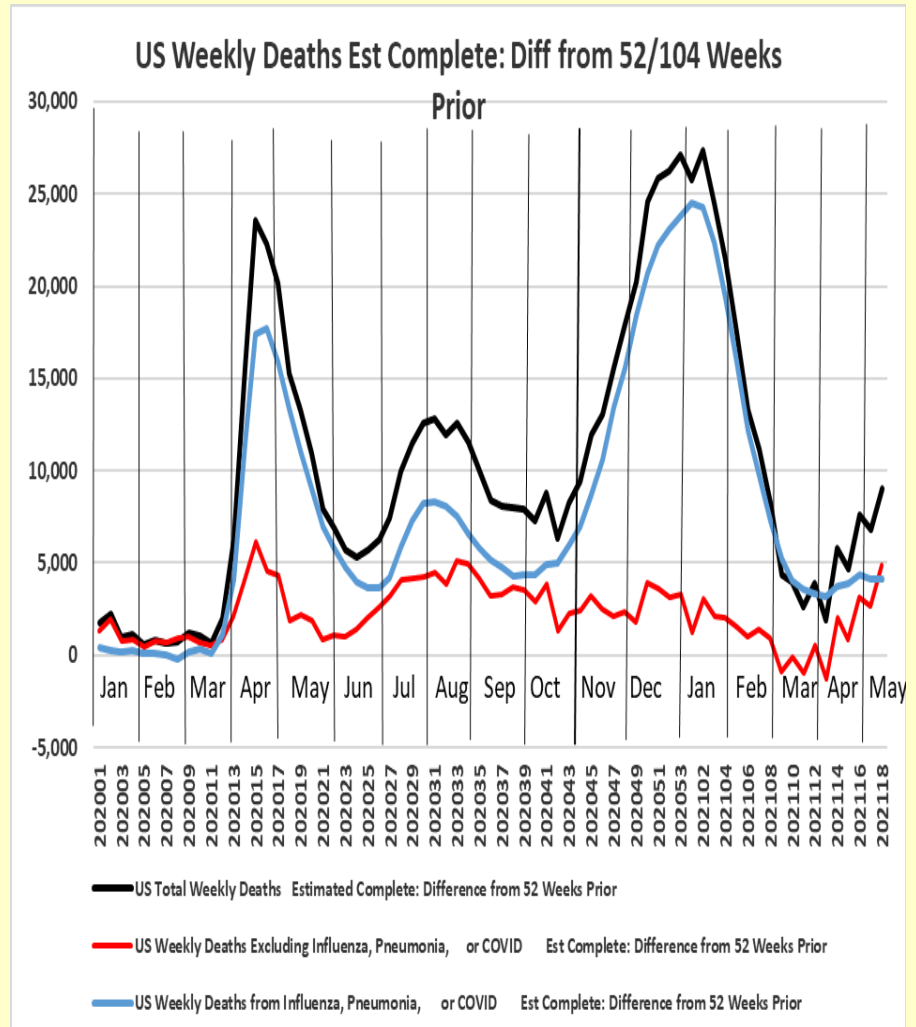
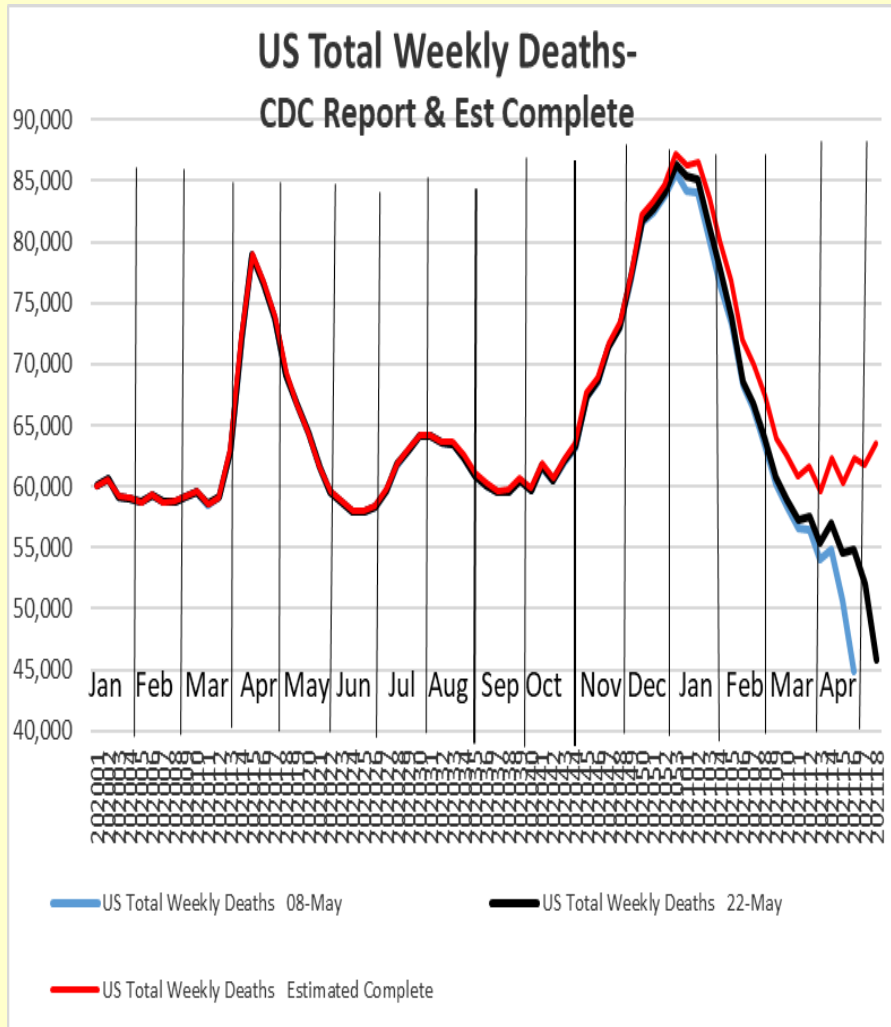
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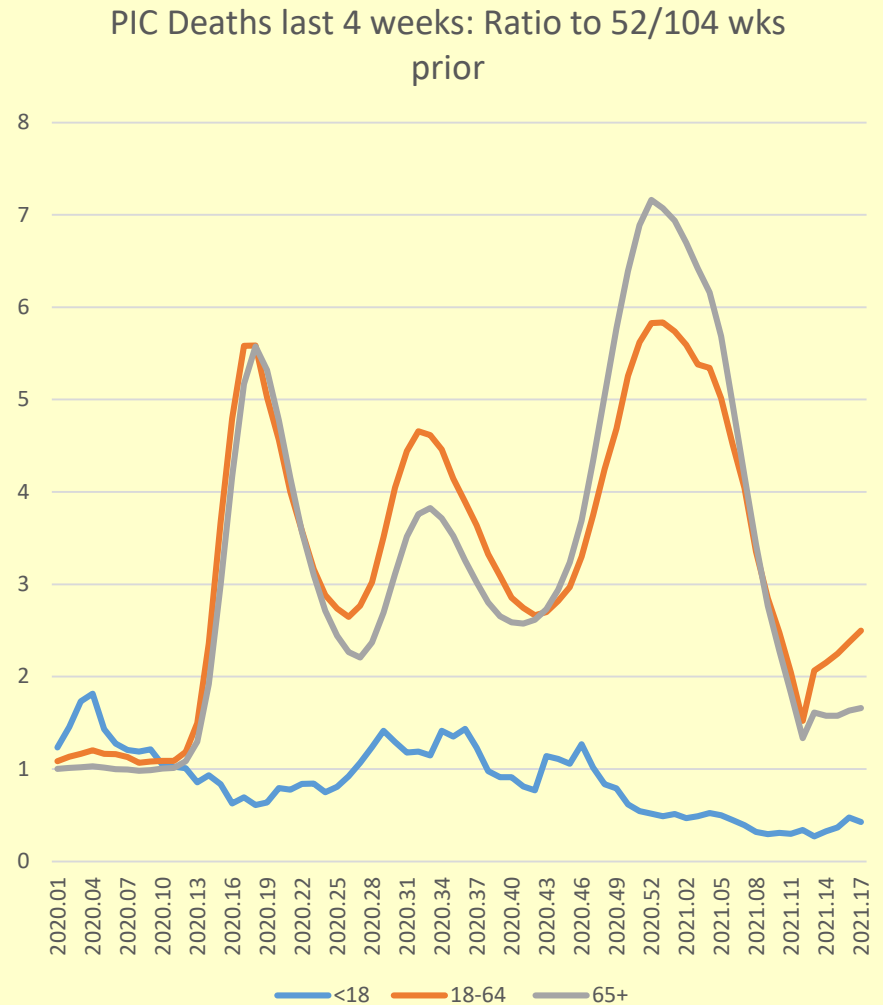
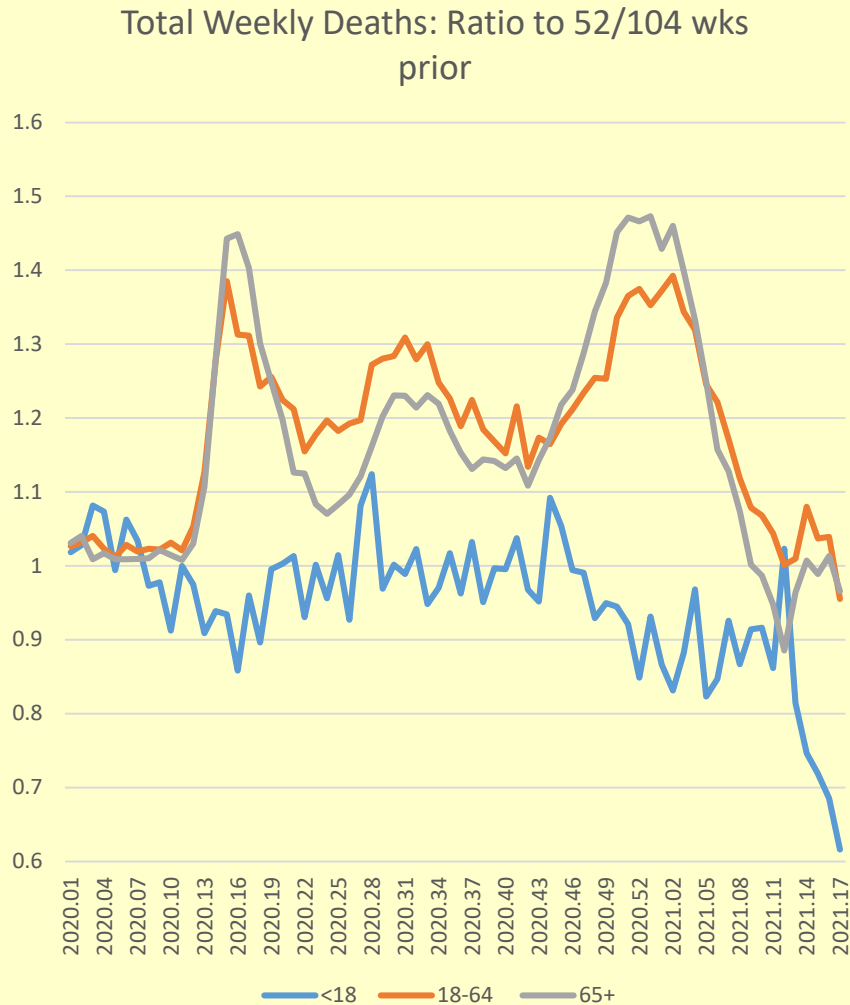
Pandemic Effects in the Near Term:

Continuing effects—this year and beyond
CDC fluview updated as of May 28, 2021



Pandemic Effects in the Near Term:

BY AGE GROUP CDC fluview updated as of May 28, 2021



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