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Mortality Projections: A US Perspective on Approaches and Challenges

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Outline

- Our primary focus today: approaches to projecting mortality and the inherent challenges
- First, a bit about COVID-19
- Endnote on investment considerations

COVID-19 Current and Long-Term Implications

- Raised death rates in US roughly 16% in 2020 and 18% in 2021
- Reduced life expectancy for affected cohorts
  - But hopefully transient, not affecting future cohorts
  - Thus, possibly no implication for “trend rate” in mortality
- However, second coronavirus in 20 years
  - Expect periodically in a now mobile world population?
- If deaths are raised by 16% in 2 of every 20 years:
  - Average *level* of mortality will be 1.6% above “trend”

Approaches That Can be Used for Projecting

- Age setback (early method)
- Age-sex rate of decline matching the past (Lee and Carter)
- Linear increase in life expectancy (Vaupel and Oeppen)
- Rate of decline by trend at all ages (2011 Technical Panel, CBO 2013-15)
- Improvement by cohort (UK CMI, SOA)
- Rate of decline by age, sex, and cause of death (SSA OCACT/Trustees)
  - Understanding conditions of the past
  - Reflecting how conditions in the future will be different

Will Life Expectancy Rise Linearly?

Vaupel/Oeppen 2002; best nations

- Requires *accelerating* rate of decline in mortality rates if retain age gradient
- LE most affected by lowest ages—only so much gain possible
- Most disagree (Vallin/Meslé)

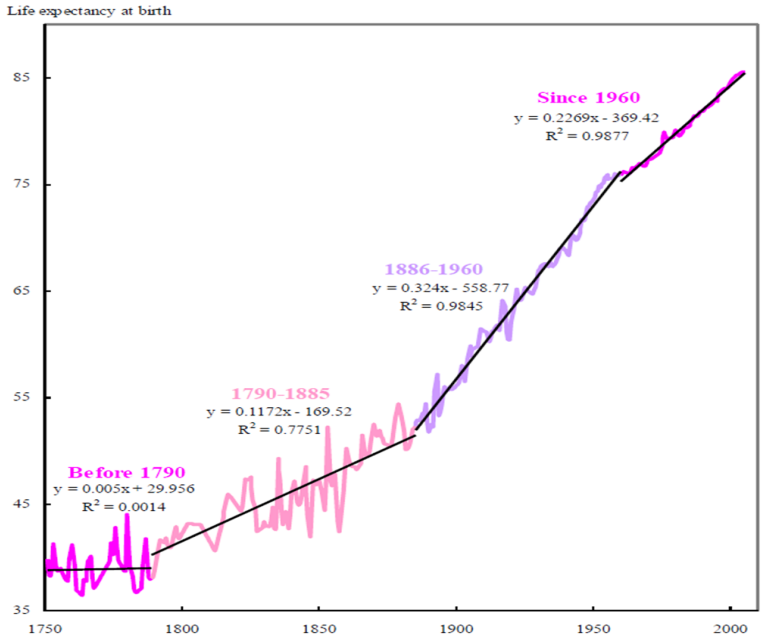


Figure 2. Maximum female life expectancy at birth since 1750 but excluding Norway (until 1866) and New Zealand

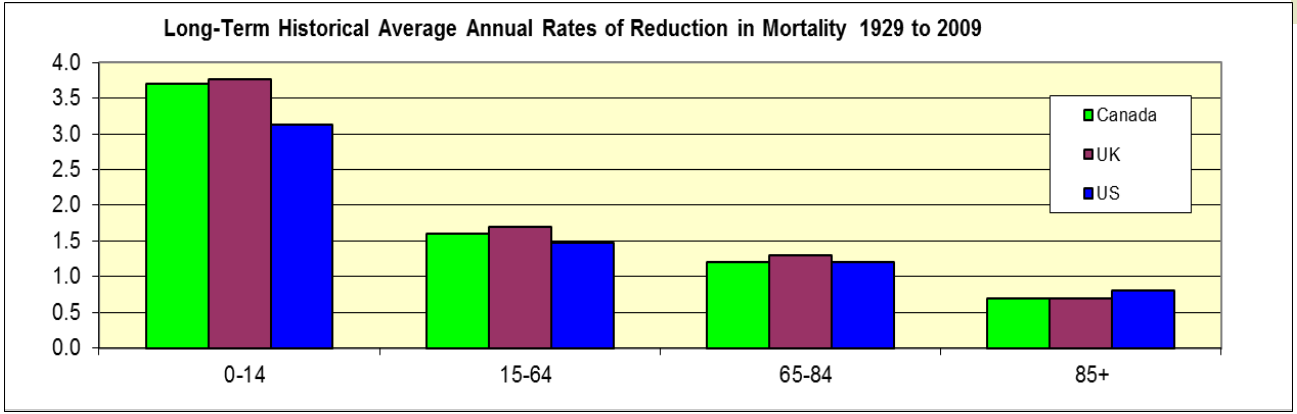
Source: Vallin and Meslé 2008

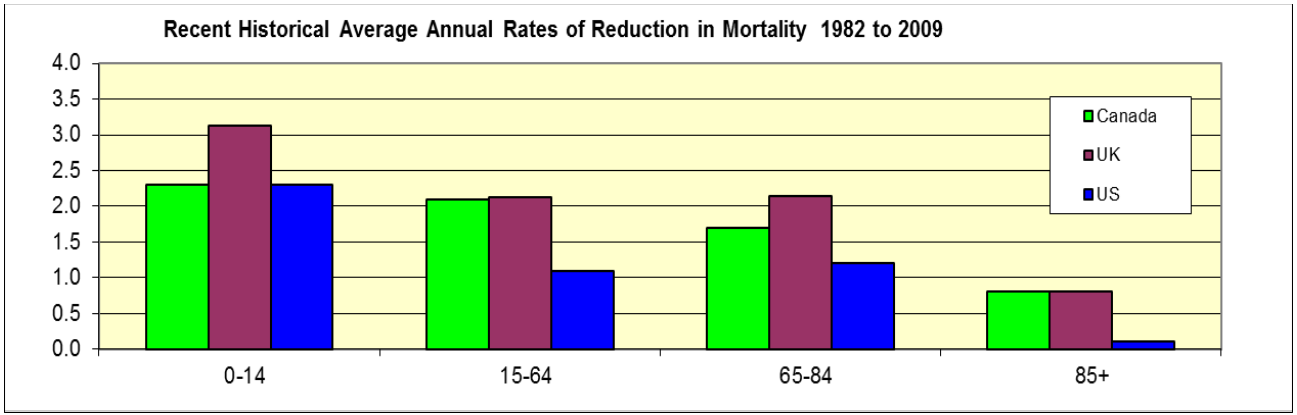
Projection by Age, Sex, Cause

- SSA OCACT/Trustees Reports
- Requires selecting ultimate rates of decline
- Allows change in age gradient
- Consistent with deceleration in mortality decline

Appropriate Data by Age Is Critical

Age gradient in past reduction is clear

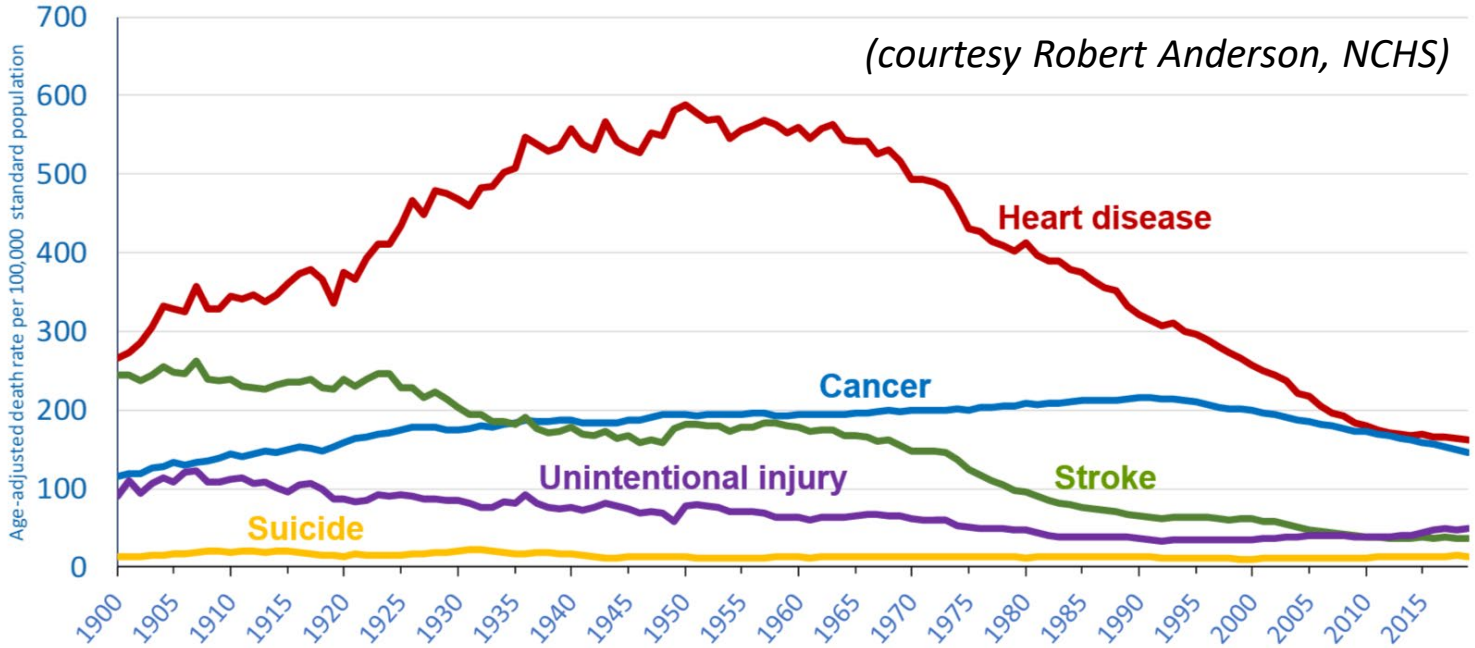




Developing Assumptions by Cause

- Scientific approach reflecting biology
- Trustees and SSA OCACT develop in consultation with other experts
- Johns Hopkins recent survey of medical researchers and clinicians came to very similar medium-term expectations—independently
- Trustees' medium-term rates by cause had not been published

Age-adjusted Death Rates Due to Selected Leading Causes of Deaths: United States, 1900-2019

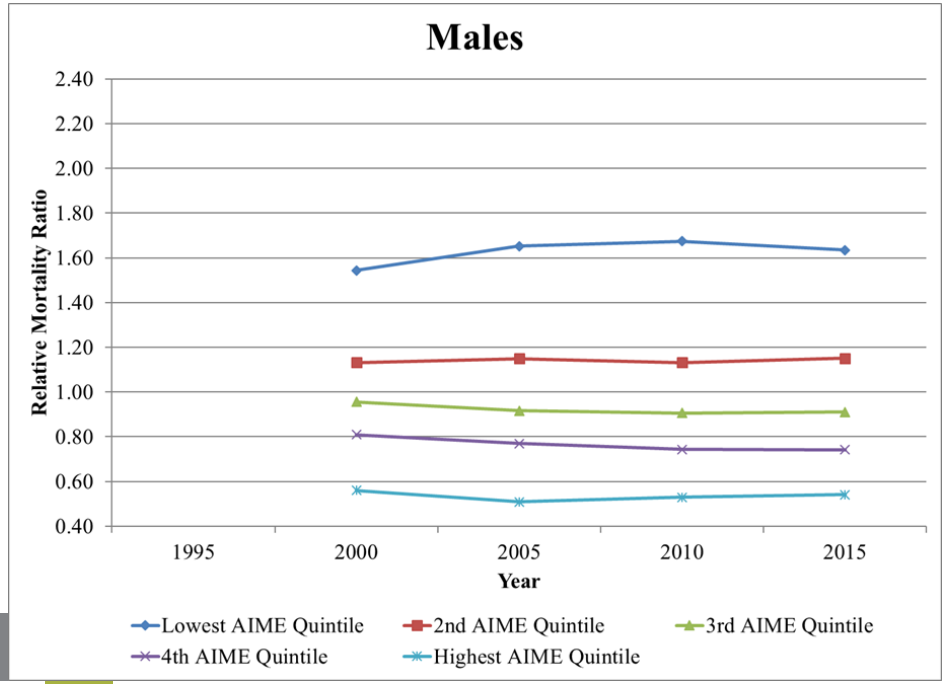


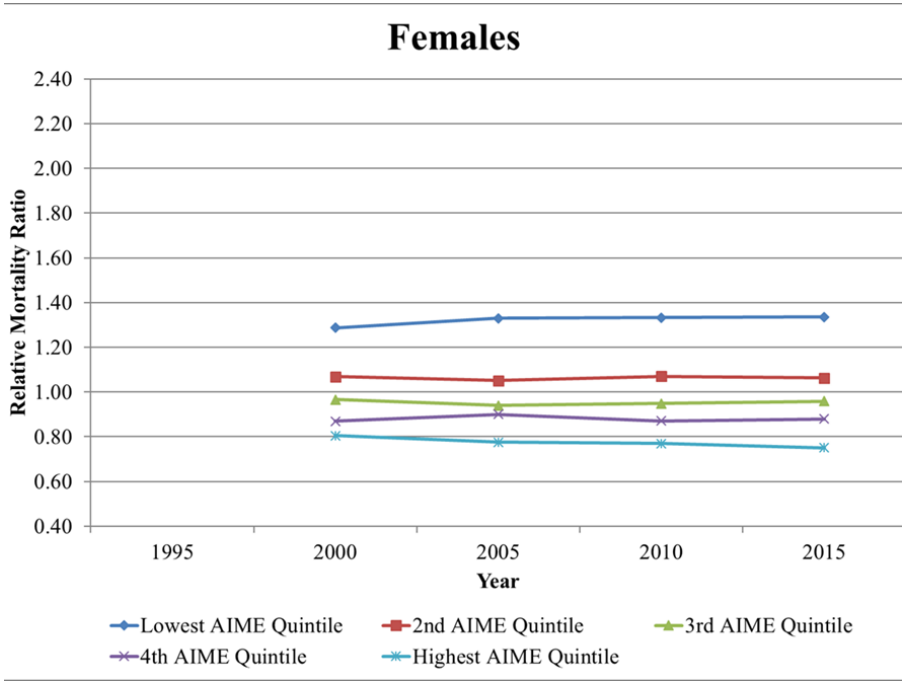
How Future Conditions Will Differ from the Past

- Heart disease past success—cancer and dementia will be harder
- Obesity—sedentary lifestyle
- Difference by income/earnings
- Health spending—must decelerate
  - Advances only help if they apply to all
- Human limits
  - Increasing recognition of deceleration

Death Rates Vary by Career Average Earnings Quintile

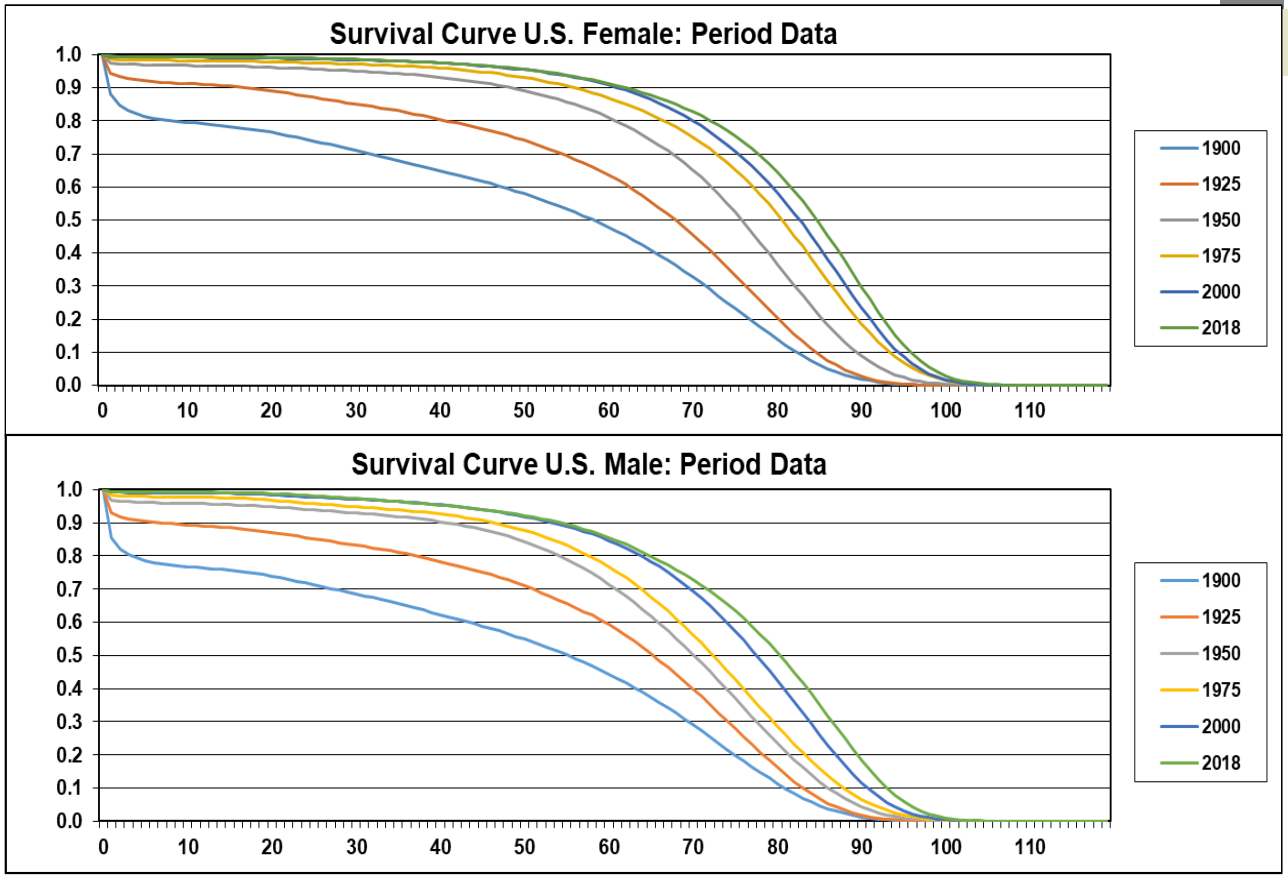
Bosley, Morris, Glenn (2018): have the spreads stabilized? At ages 65-69:





Is There an Omega?

It appears we are rectangularizing the survival curve

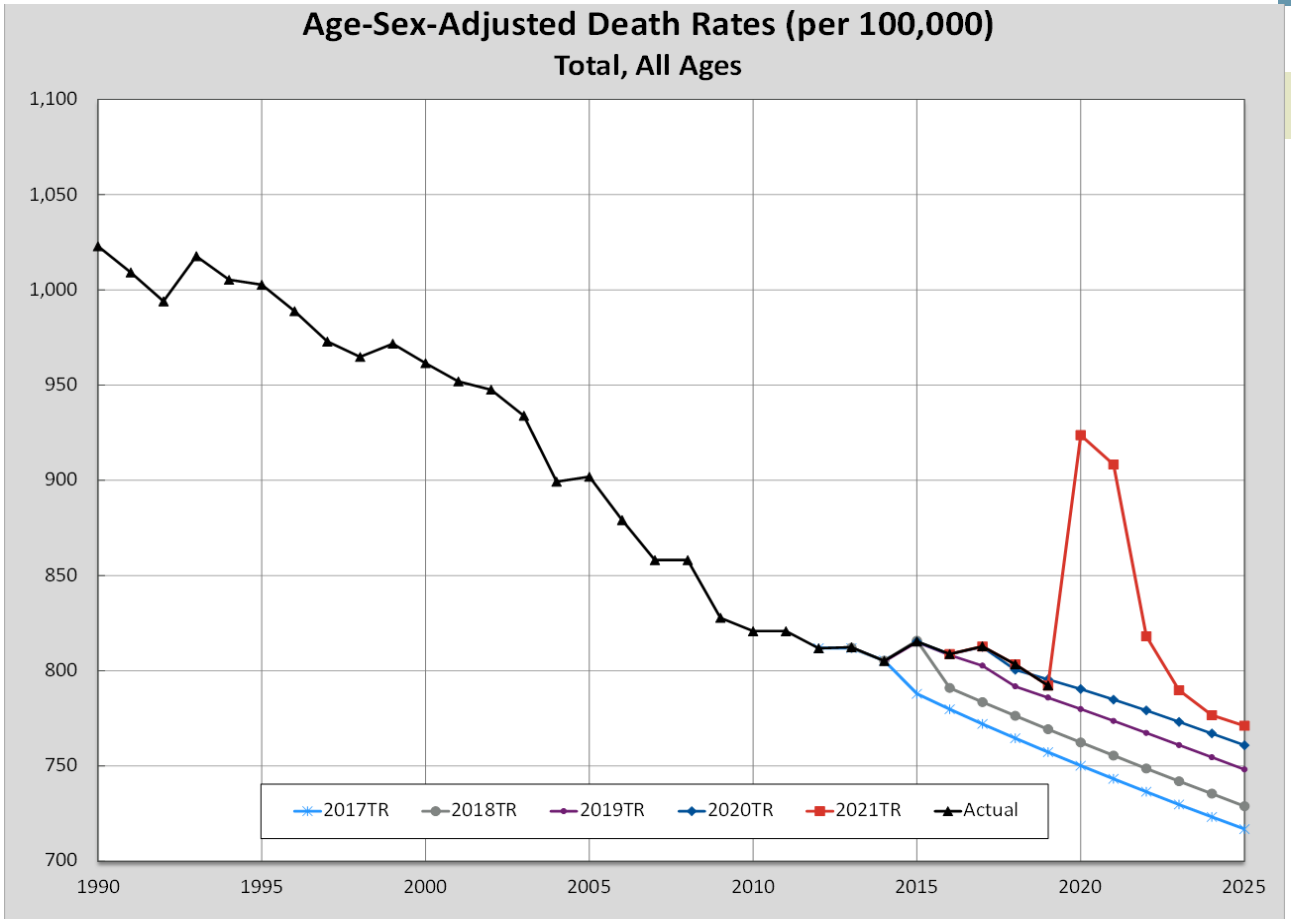


Death Rates Will Continue to Decline: But How Fast and for Whom?

- 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 in 2015 to be 19.03; actual was 19.05

Mortality Experience: All Ages

Reductions slow after 2009, and continue to fall short of past trend



Endnote: Investment of Reserves for Funding

- Substantial advance funding is difficult for social insurance
  - US social insurance has only “contingency reserves”
  - If more, what is the effect on markets? How much should SI hold?
- How to invest?
  - Low-risk but low-yield government bonds?
  - Private securities with higher expected yields?
- How to “value”?
  - Expected yield, or “risk adjusted”?

For More Information… http://www.ssa.gov/oact/

- Documentation of Trustees Report data & assumptions https://www.ssa.gov/oact/TR/2021/2021_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
- Email us at actuary@ssa.gov

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