Declining Mortality (Increasing Longevity): At What Rate? At What Ages?

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US Social Security Administration

2020 Living to 100 Symposium
General Session IV - Mortality Projection from a Social Security Panel
January 14, 2020
Perspective: “Aging” Not Mainly from Mortality

Aging (change in age distribution) mainly due to drop in birth rates
Considerations in Projecting Mortality

- Variation over time periods
- Variation by age
- Variation by earnings level
- Changing causes of death
- Cohort considerations
- Health spending, obesity, smoking, opioids
- Is there a limit on human longevity?
- Our projections for the United States
Life Expectancy at Birth Not a Useful Indicator; Age Distribution of Death Rates Most Important
Mortality Decline *Varies* Over Time

Conditions: Antibiotics/economy 1936-54; Medicare/Medicaid 1968-82
Opioids? Affected Age 15-64 Mortality Decline Since 1999, but Not the Deceleration Since 2009

Female Comparison of Mortality Improvement Including and Excluding Deaths from Opioids

Male Comparison of Mortality Improvement Including and Excluding Deaths from Opioids
Mortality Experience: All Ages
Reductions falling short of expectations since 2009
Mortality Experience: Ages 65 and Over

Reductions falling short of expectations since 2009

Age-Sex-Adjusted Death Rates
(Ages 65 and Older)
Variation by Age is Substantial

Age-gradient in past reduction is clear

Long-Term Historical Average Annual Rates of Reduction in Mortality 1929 to 2009

Recent Historical Average Annual Rates of Reduction in Mortality 1982 to 2009
Mortality By Career-Average Earnings Level: Actuarial Study #124

Age group 65-69 relative mortality ratios—not diverging?
Mortality Decline by *Cause of Death*: Rate of change from 1979 to 2017
Age-adjusted Death Rates for Heart Disease, Cancer, Stroke, and Unintentional Injuries: United States, 1900-2015

(courtesy Robert Anderson, NCHS)

Rate per 100,000 standard population

Heart disease

Cancer

Stroke

Unintentional injuries

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

- Scientific approach reflecting biology
- Trustees and SSA/OCACT develop in consultation with other experts
- Johns Hopkins survey of medical researchers and clinicians came to very similar medium-term expectations—individually
  - Trustees’ medium-term rates by cause had not been published
Cardiovascular: JHU Less Optimistic than Trustees Over Age 50 for Next 30 Years

**Cardiovascular Disease-Female**

Average Annual Percent Reduction

JHU values are for the period 2009-2040

- **1979 to 2010**
- **2010 to 2038**
- **2038 to 2088**

**Cardiovascular Disease-Male**

Average Annual Percent Reduction

JHU values are for the period 2009-2040

- **1979 to 2010**
- **2010 to 2038**
- **2038 to 2088**
Respiratory: JHU More Optimistic Under Age 50, Less Optimistic Over Age 85

**Respiratory-Female**

*Average Annual Percent Reduction*

JHU values are for the period 2009-2040

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<thead>
<tr>
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**Respiratory-Male**

*Average Annual Percent Reduction*

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Cancer: JHU Very Similar to Trustees’ Expectations

### Cancer-Female

**Average Annual Percent Reduction**

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### Cancer-Male

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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:
    \[\text{Then expect lower mortality over age } x\]
  – But if medical interventions have just reduced deaths:
    \[\text{Then cohort mortality over age } x \text{ could be worse, with increased numbers of impaired survivors}\]
  – What does one cohort imply for the next cohort?
    \[\text{Further changes depend on conditions, not trend}\]
How Future Conditions Might Change

- Smoking decline for women
  - Started and stopped later than men
- Obesity—sedentary lifestyle
- Health spending—must decelerate
  - Advances help only if they apply to all
- Human limits
  - Increasing understanding of deceleration

Sam Preston 2010—must consider cumulative effects
Increasing duration of obesity for aged in future
Does Health Spending Affect Mortality?

*Note rise, at least through 2009*
Health Spending Cannot Continue to Rise at Historical Rates

Note Trustees’ deceleration

Annual Percent Change in Medicare Cost per Beneficiary Relative to GDP per Worker: 2015 TR

1970-1980: 5%
1980-2010: 3%
2010-2040: 0%
2040-2070: -1%
2070-2085: -1%
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 TR, we projected LE65 for 2013 to be 19.0; actual was 19.1
Ultimate (2043 to 2093) Projected Rates of Decline: Similar to Period Since 1900 for Age 50+

Intermediate projections in the 2019 Trustees Report
Projected Age-Sex-Adjusted Death Rates, All Ages

Total Age-Sex-Adjusted Death Rates for Alternative II of the 2019 TR

LOG Scale
Projected Age-Sex-Adjusted Death Rates, Ages 65 and Over

Age-Adjusted Death Rates for 65 and Older Under Alternative II of the 2019 TR

LOG Scale

Year

Deaths per 100,000

MALE

FEMALE

Year

Deaths per 100,000

MALE

FEMALE
Ultimately, the Changing Age Distribution of the Population is the Main Factor for Social Security
For More Information…

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

- Documentation of Trustees Report data & assumptions

- Historical and projected mortality rates
  https://www.ssa.gov/oact/HistEst/DeathHome.html

- Annual Trustees Reports
  https://www.ssa.gov/oact/TR/index.html