

Declining Mortality (Increasing Longevity): At What Rate? What Role in “Aging”?

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**Society of Actuaries Annual Meeting
Panel Discussion 26
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Keeping it all in perspective:

Real issue is that developed nations are “aging”

■ “Macro aging”

Changing age distribution

- Lower birth rates since 1965
- Less growth for new generations

■ “Micro aging”

People are living longer, due to:

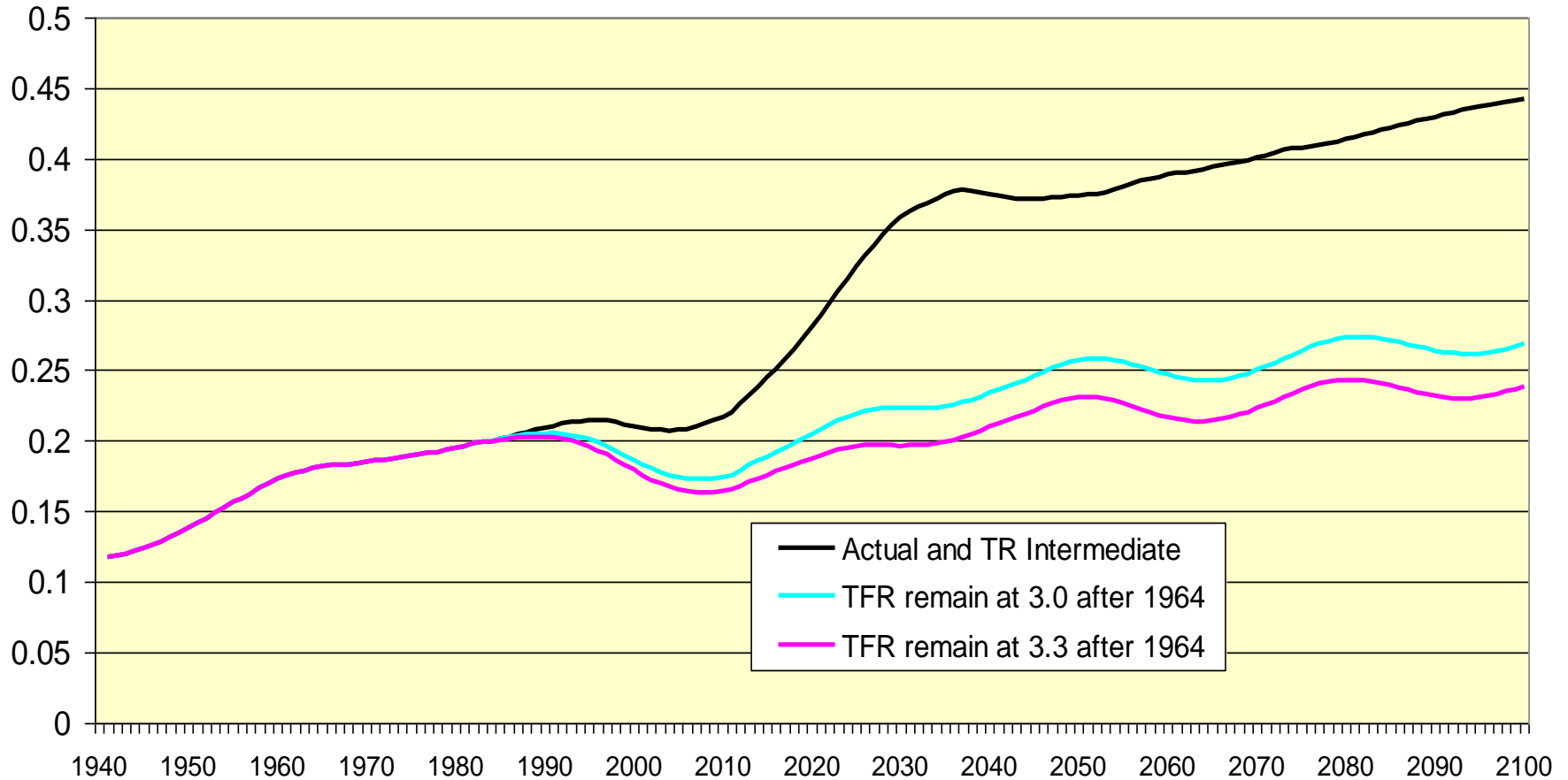
- Lower death rates
- Higher life expectancy

■ Different challenges—different solutions

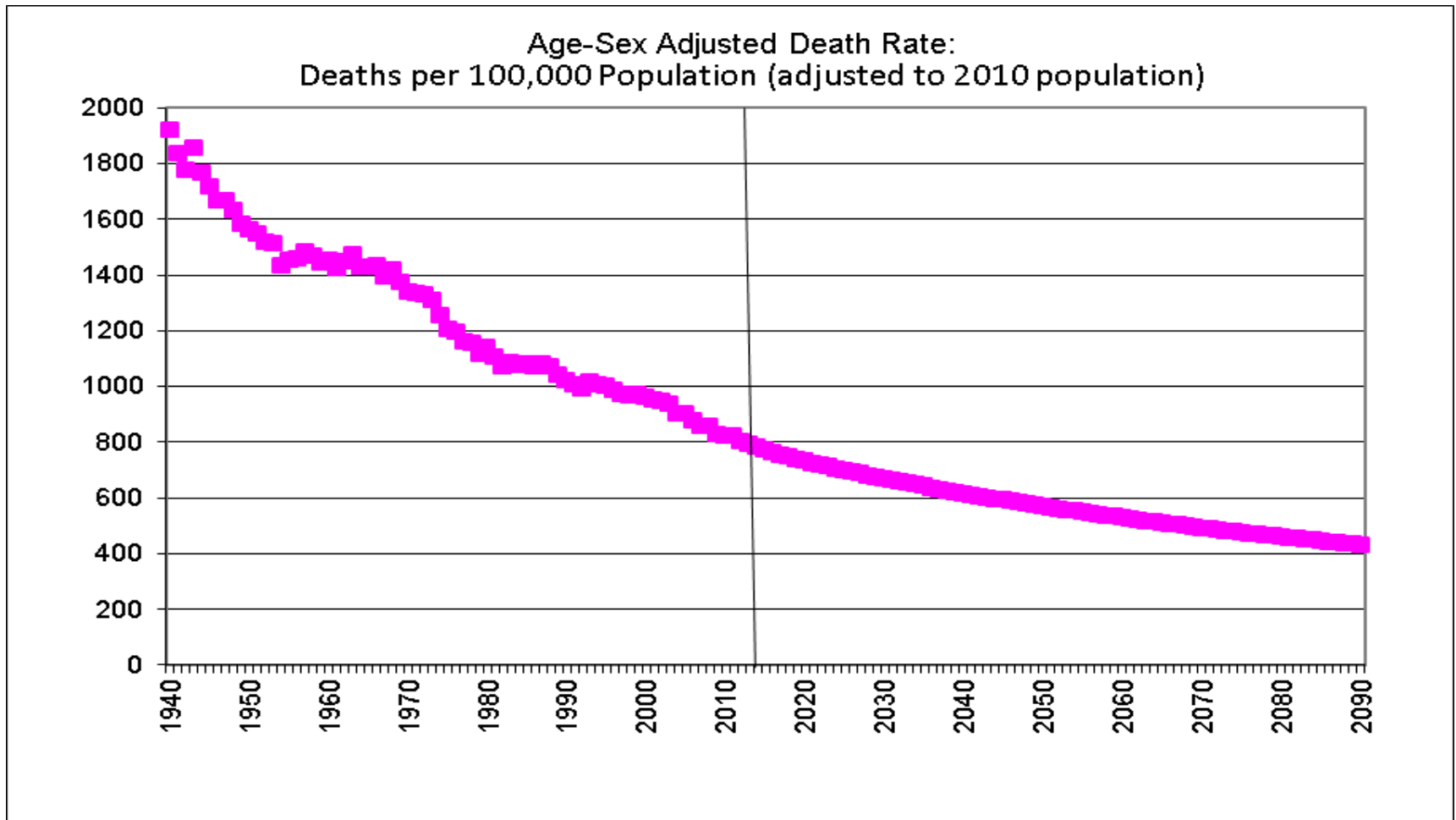
Cause of “Macro Aging”:

Mostly due to drop in birth rates

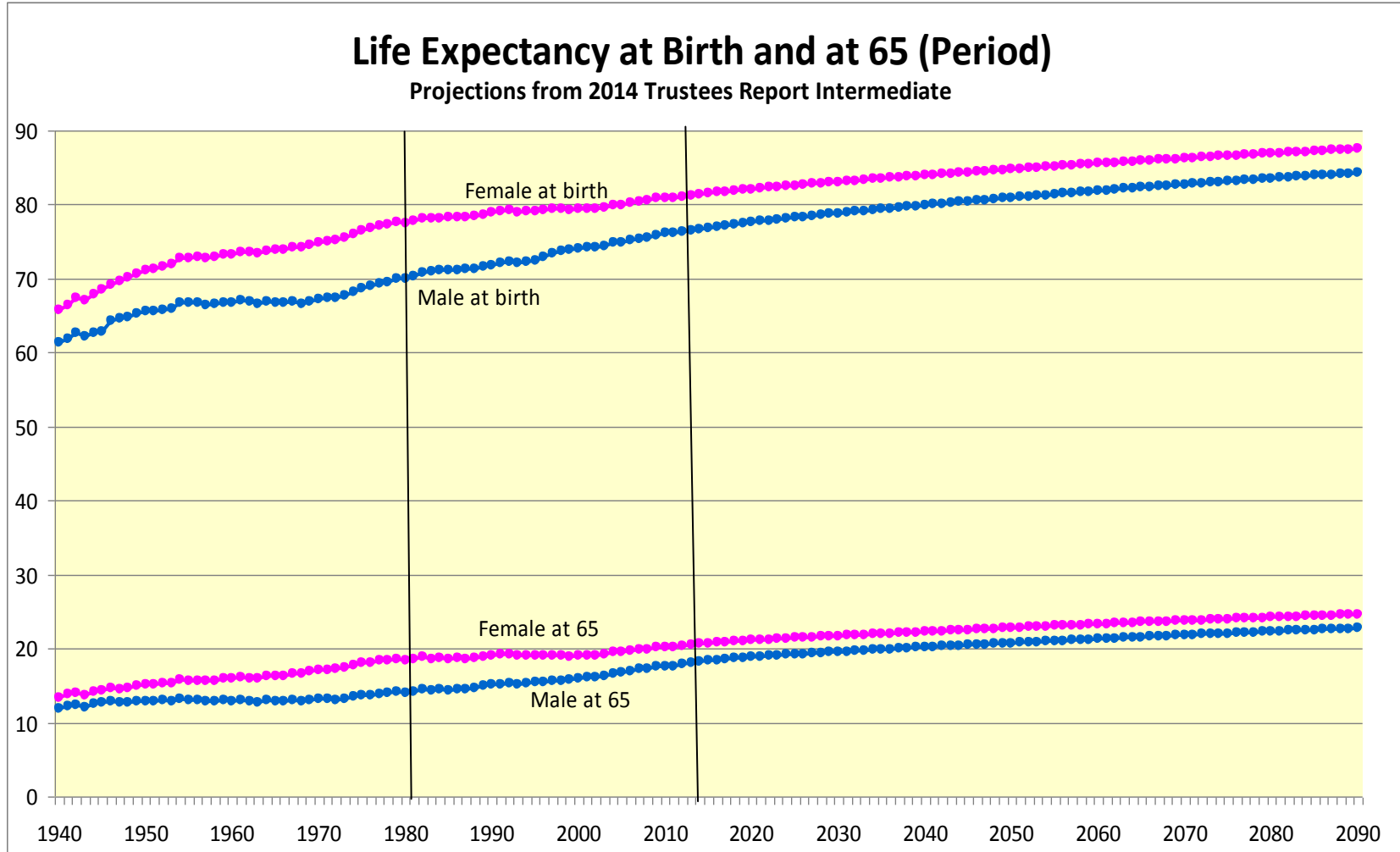
Aged Dependency Ratio (Population 65+/20-64) 2012 TR



Cause of “Micro Aging”: Mostly due to declining death rates



Implications of “Micro Aging”: Rising life expectancy



Measuring and projecting Longevity/Mortality

■ Life expectancy (LE)

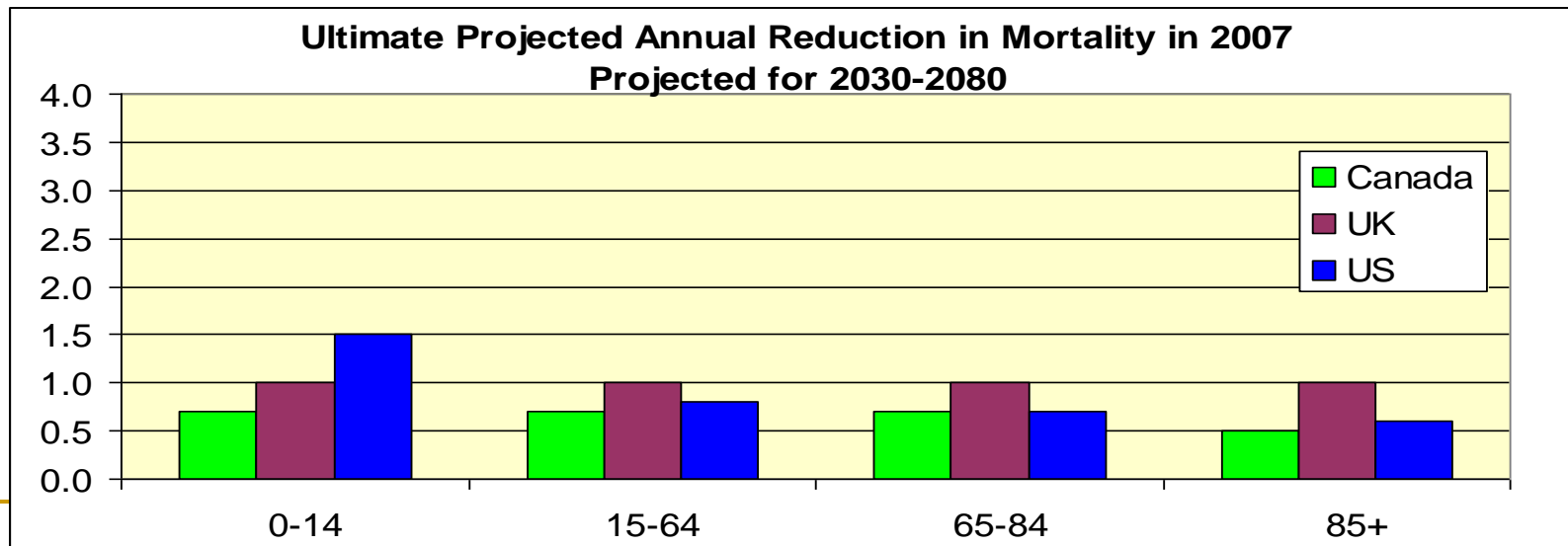
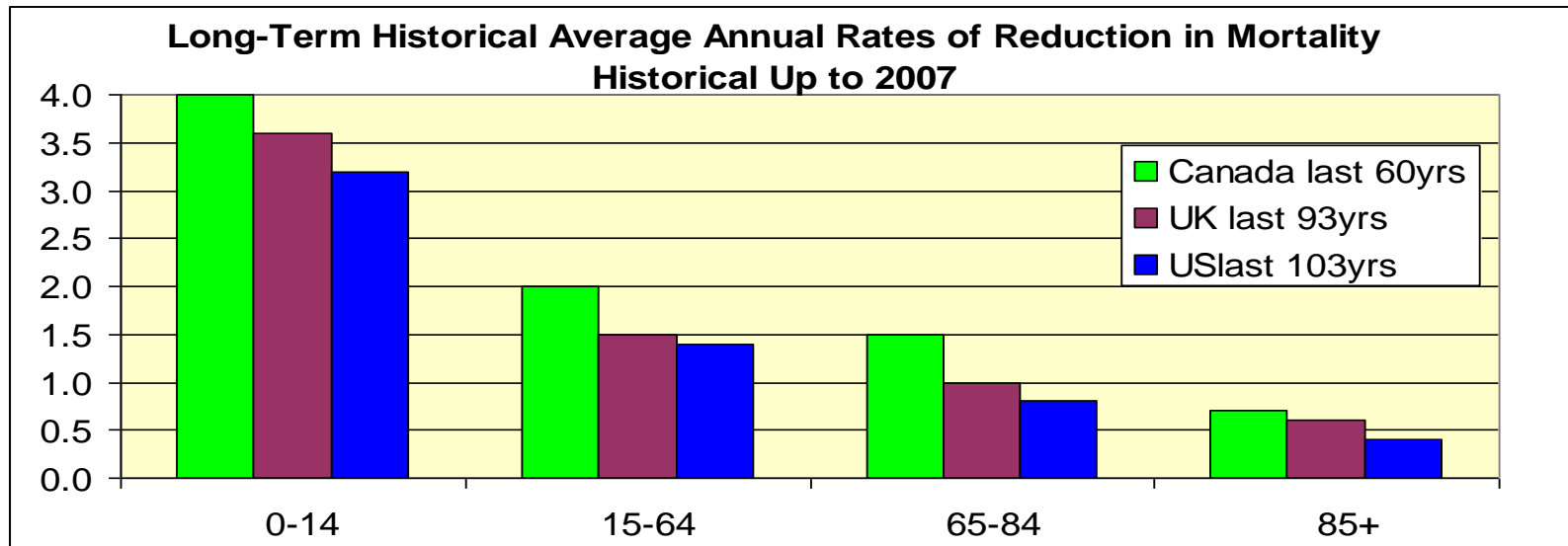
- Appealingly simple, but:
 - Overweights changes in q_x at youngest ages
 - LE decelerates as q_x reduction moves to higher ages

■ Age-sex-adjusted death rates

- Much better for analysis and projection
- q_x reduction by age is **critical** for pension cost
 - Reduced q_x under about age 35—lower cost
 - Reduced q_x over about age 35—higher cost

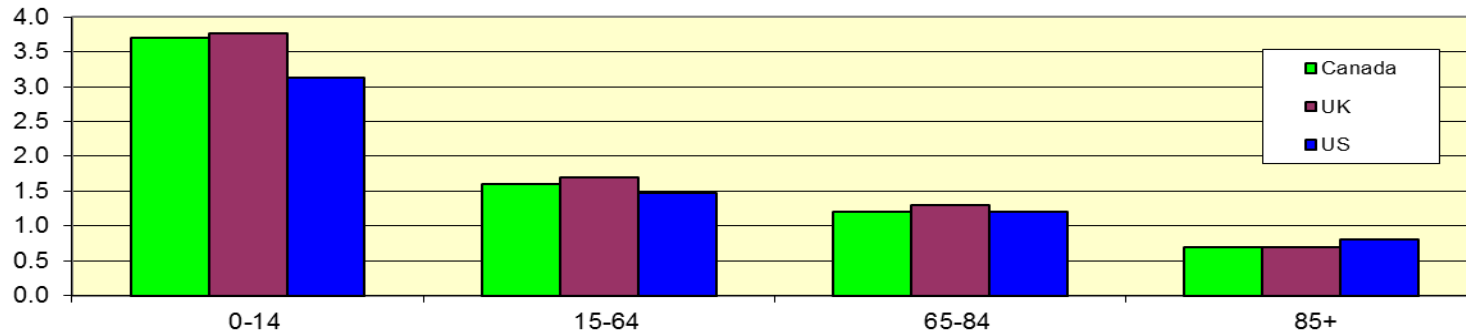
Historical & Projected back in 2007: opinions varied

Will biologic limits continue to enforce slower reduction at high ages?

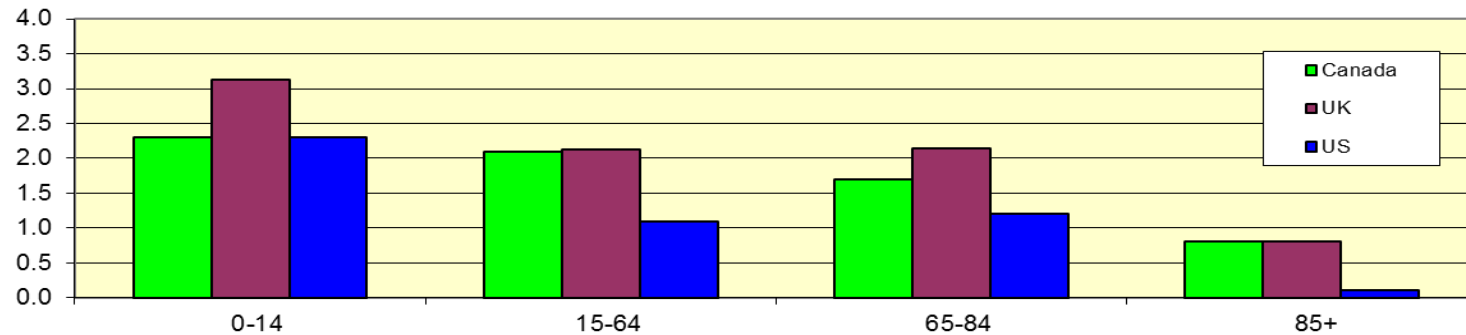


Historical & Projected in 2013: opinions still vary

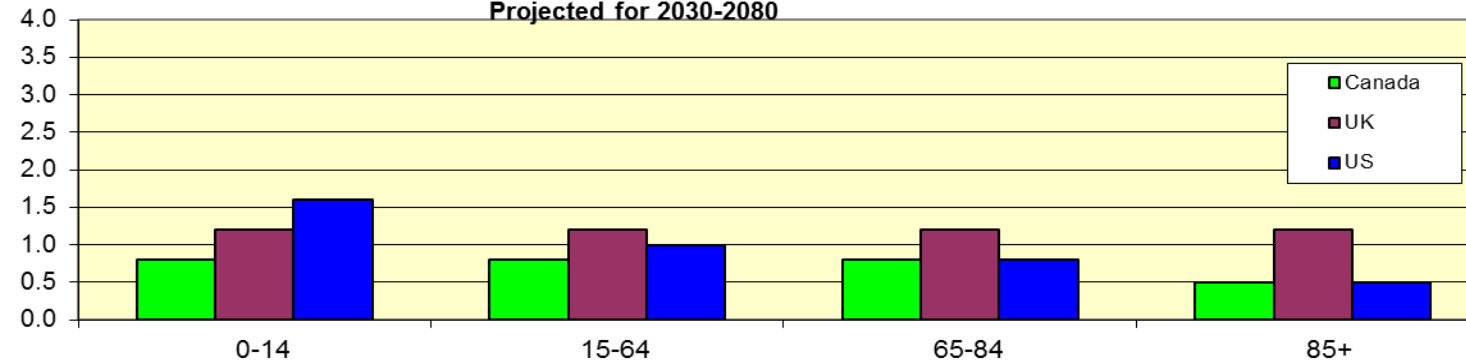
Long-Term Historical Average Annual Rates of Reduction in Mortality 1929 to 2009



Recent Historical Average Annual Rates of Reduction in Mortality 1982 to 2009

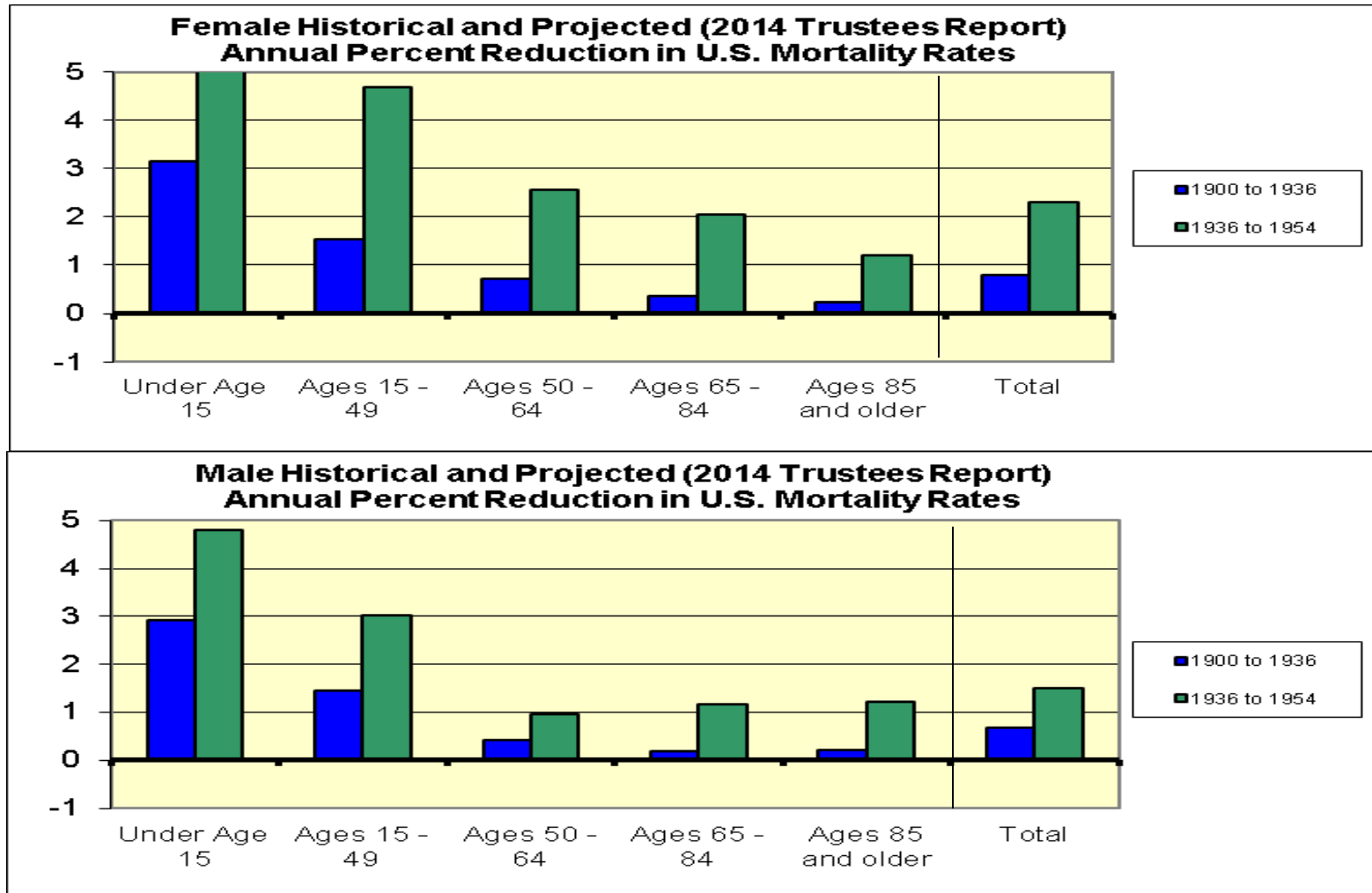


Ultimate Projected Annual Reduction in Mortality in 2013
Projected for 2030-2080



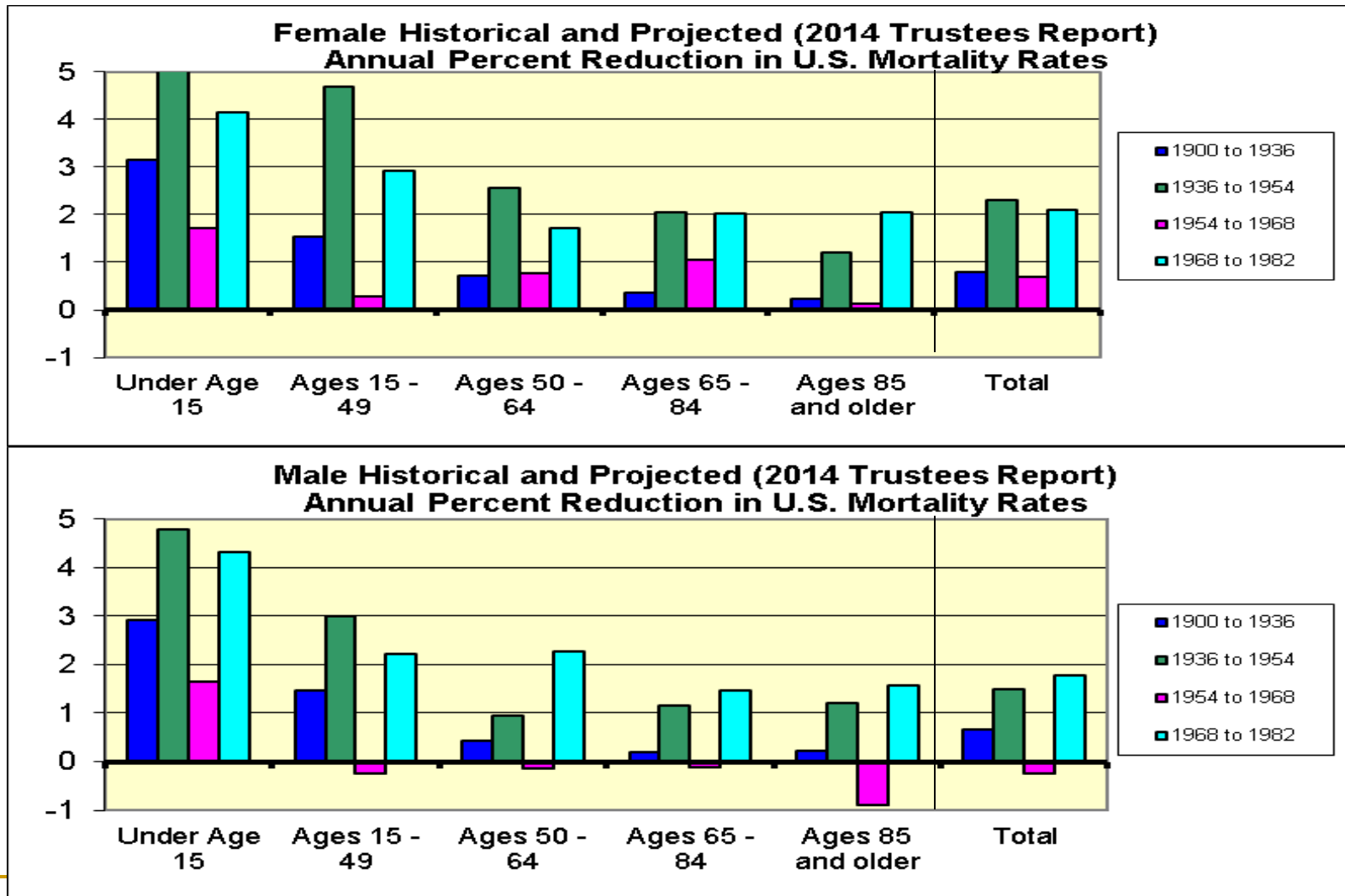
U.S. age-gradient in qx reduction 1900-1954

Antibiotics and post-WW2 dramatic advances



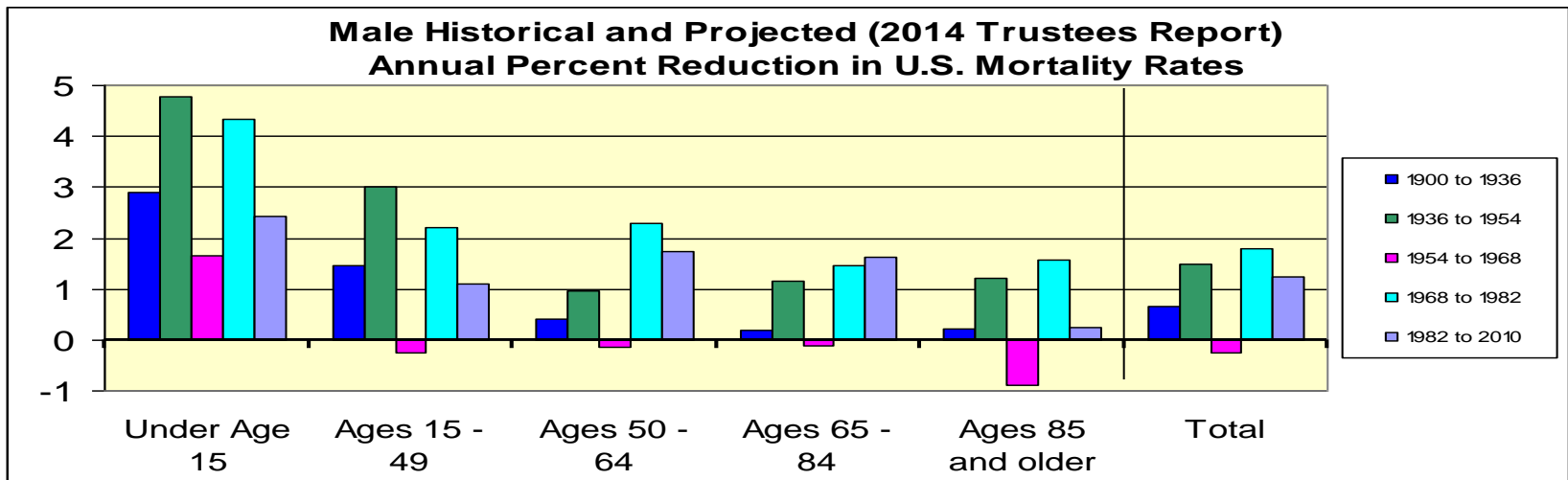
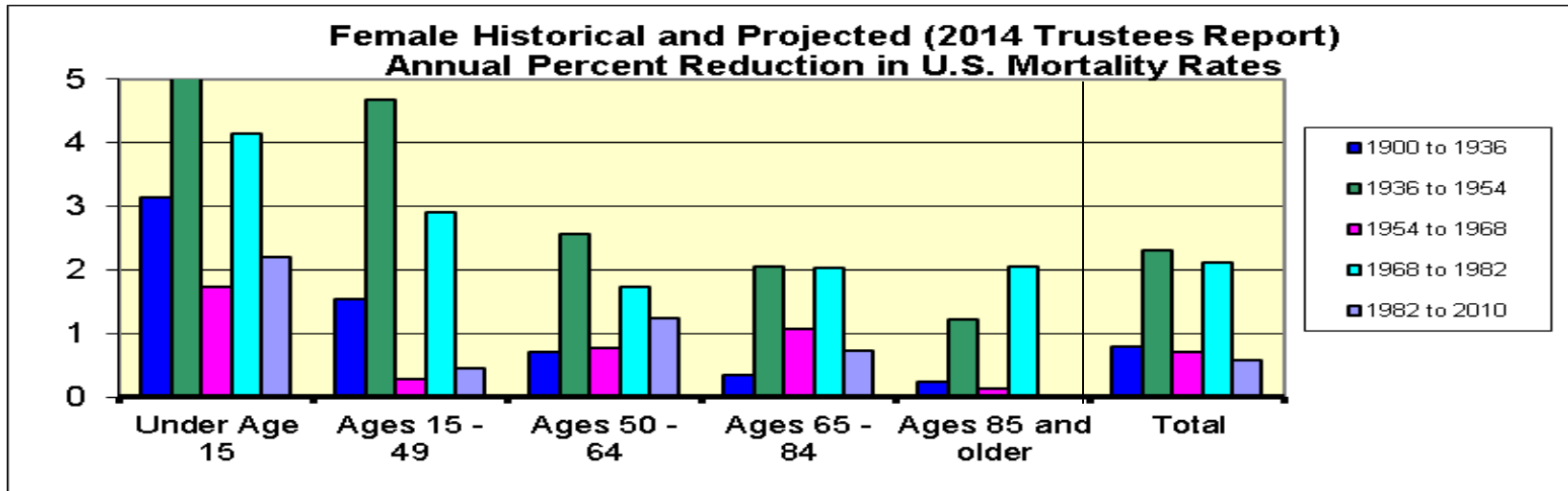
U.S. age-gradient in qx reduction 1900-1982

Medicare & Medicaid dramatic effect in 1960's



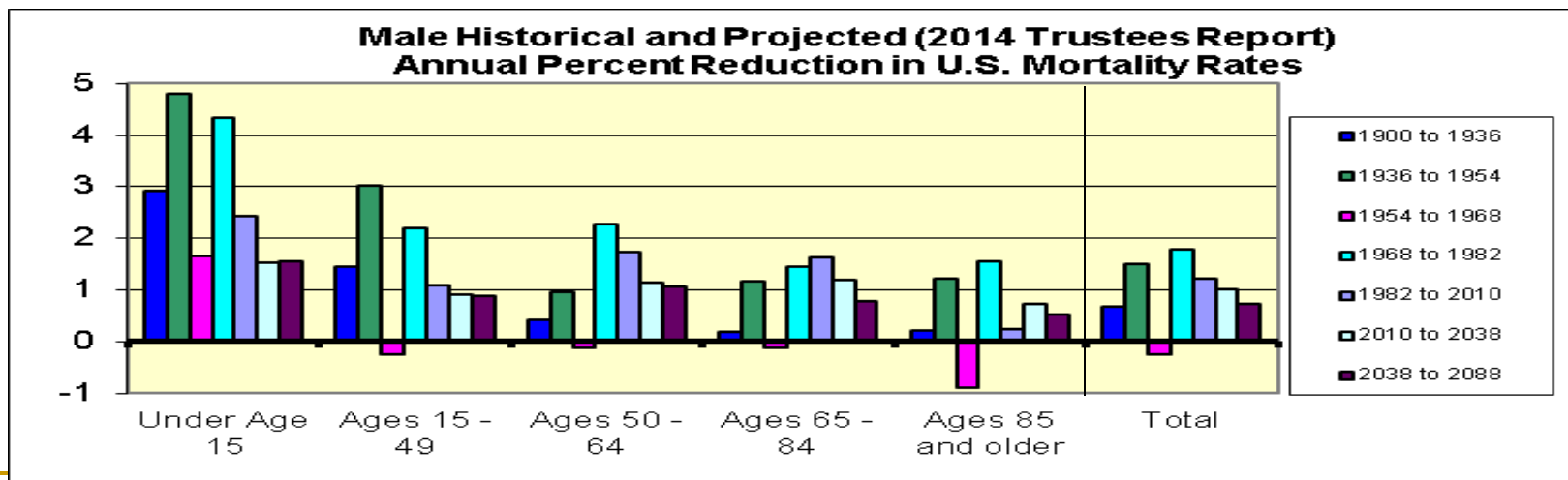
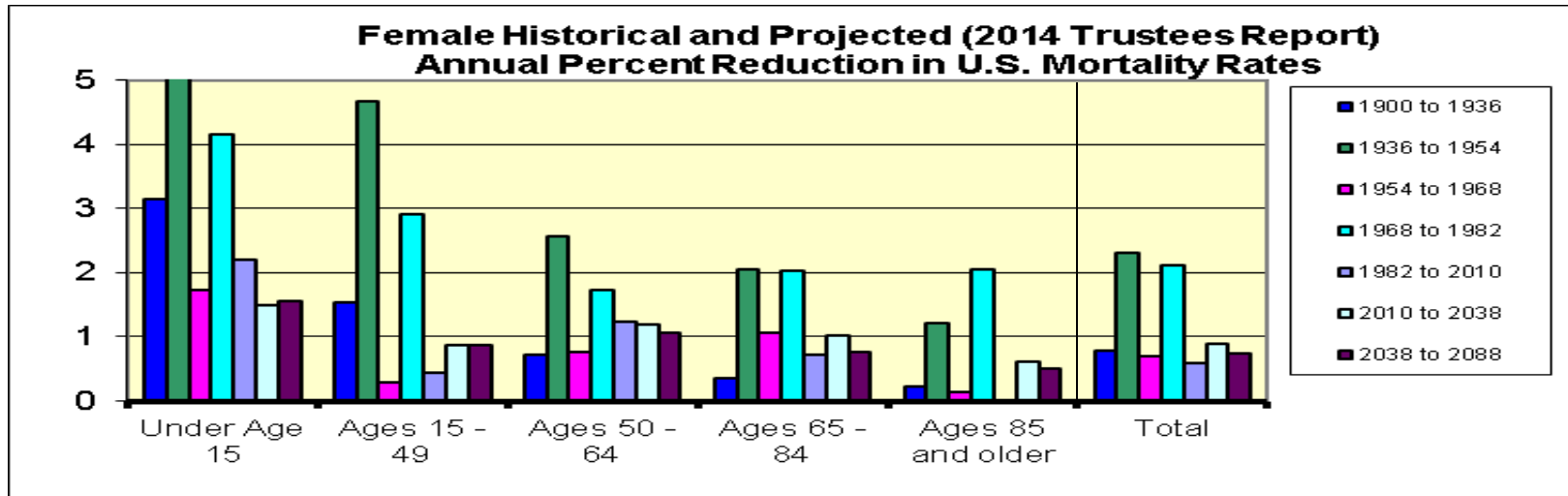
U.S. age-gradient in qx reduction 1900-2010

Post 1982, back to reality except cardio (50-84)



Age-gradient in qx reduction 1900-2088

Reduced gradient but NOT to 0... BIOLOGY



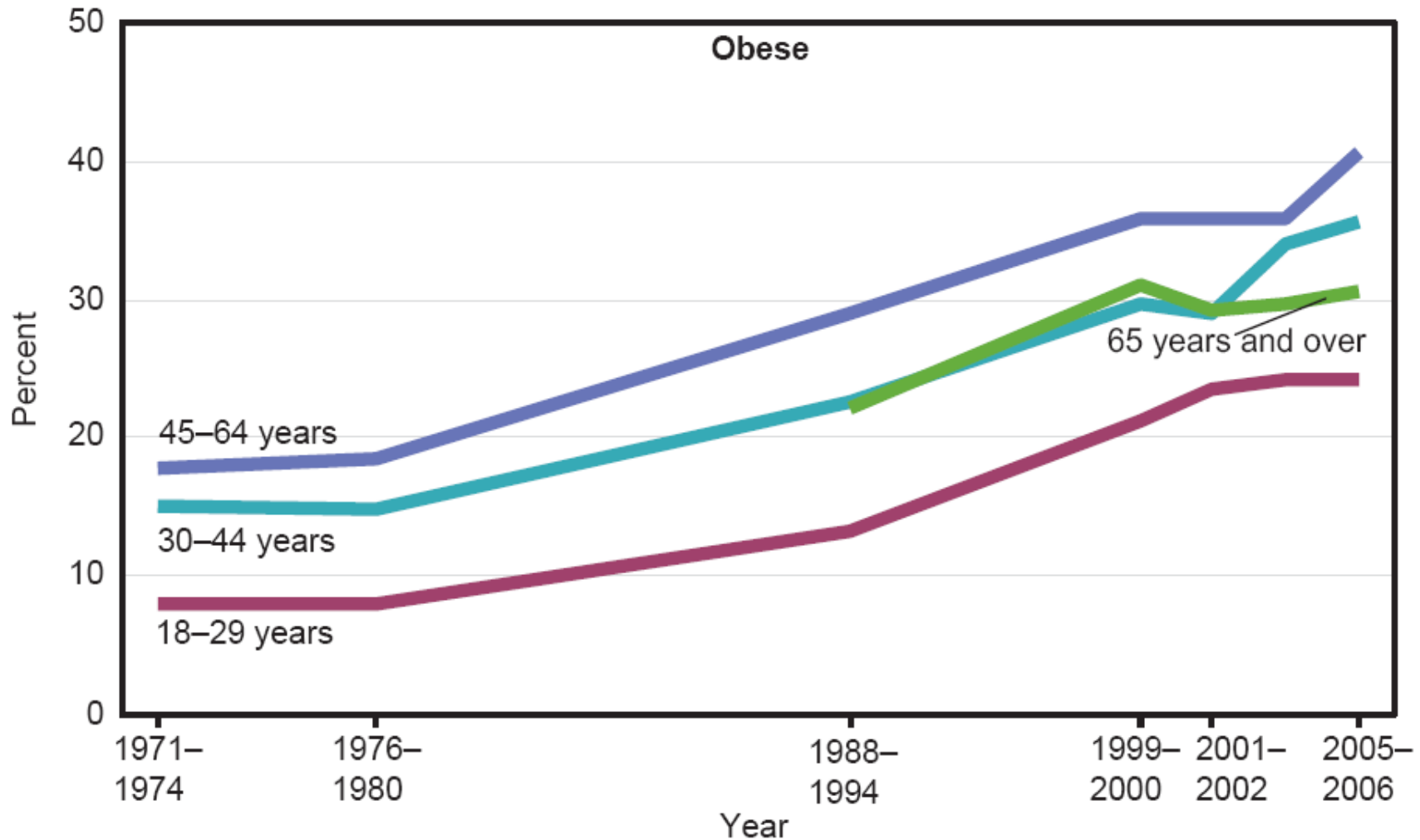
No simple formula or extrapolation can “predict” the future

- Must consider conditions of the past
- ...and how these conditions will change
 - Smoking
 - Obesity
 - Medical technology
 - Cost of applying best practice to all
 - Spending on medical will decelerate in the US
 - **Can we consider these factors without cause of death?**

Example: Trends in Obesity: US 1971-2006

Sam Preston 2010—must consider cumulative effects

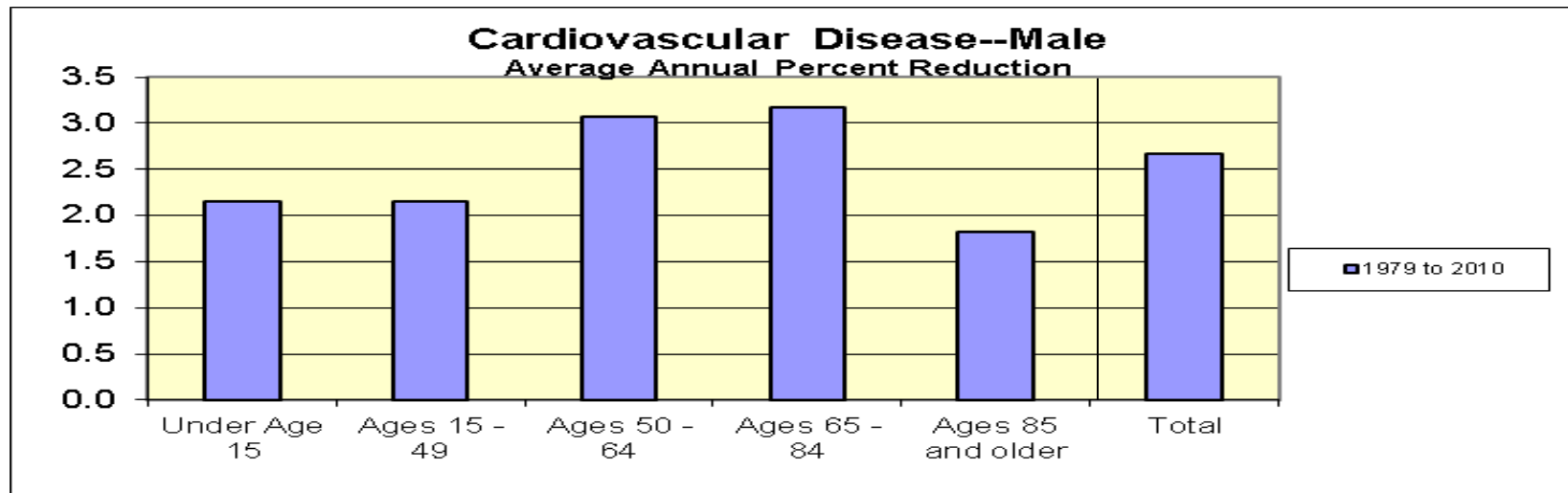
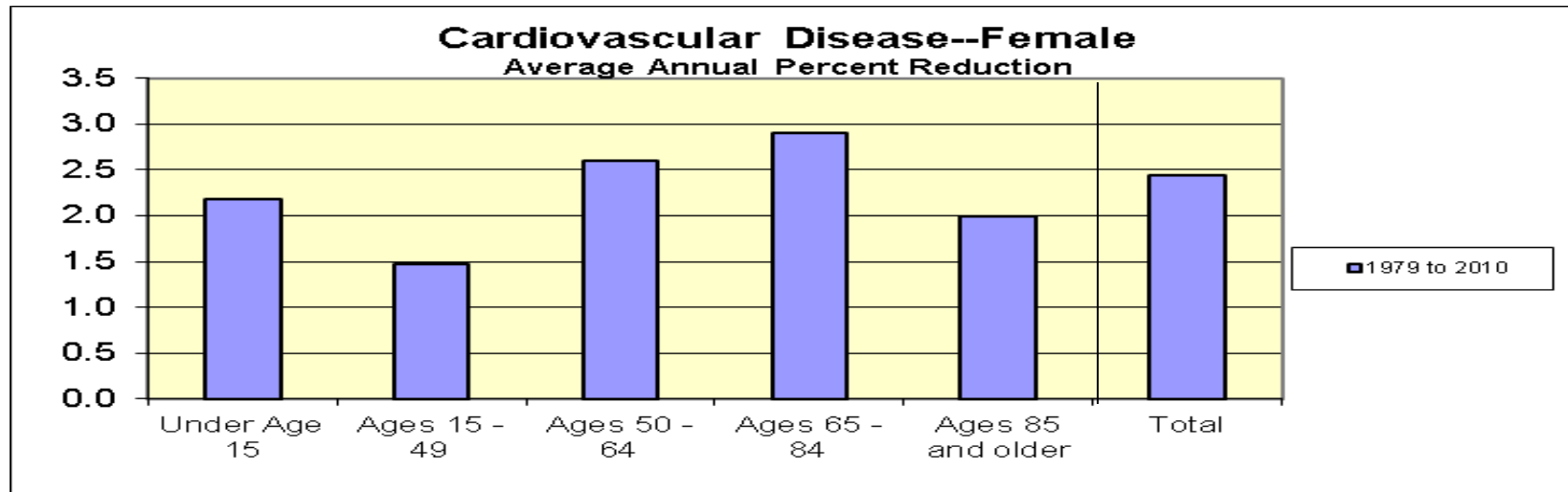
Increasing duration of obesity for aged in future



Consider recent historical change in death rates for 5 Cause-of-Death groups:

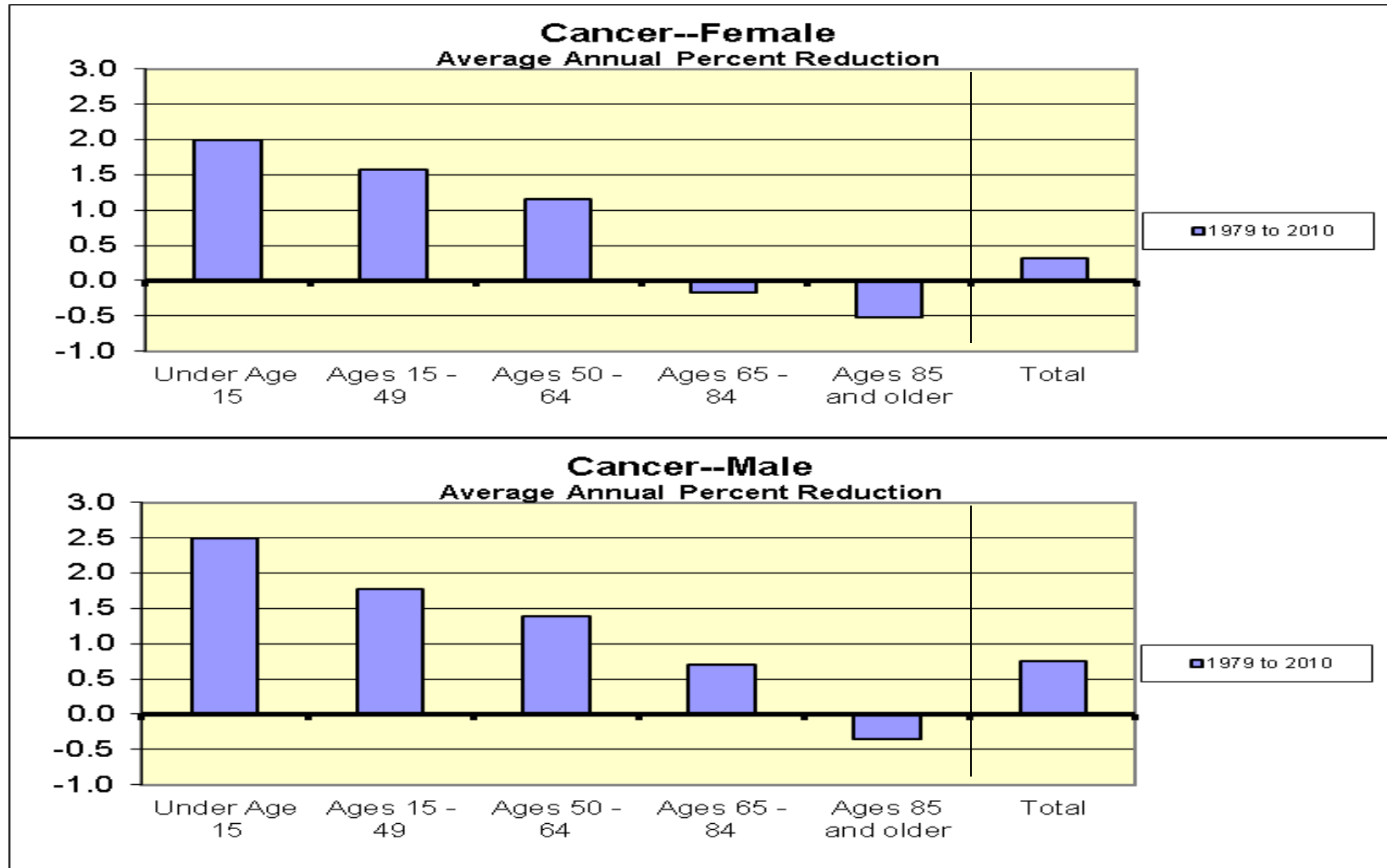
- Cardiovascular
- Cancer
- Violence
- Respiratory
- Other

Cardiovascular has had huge advances recently

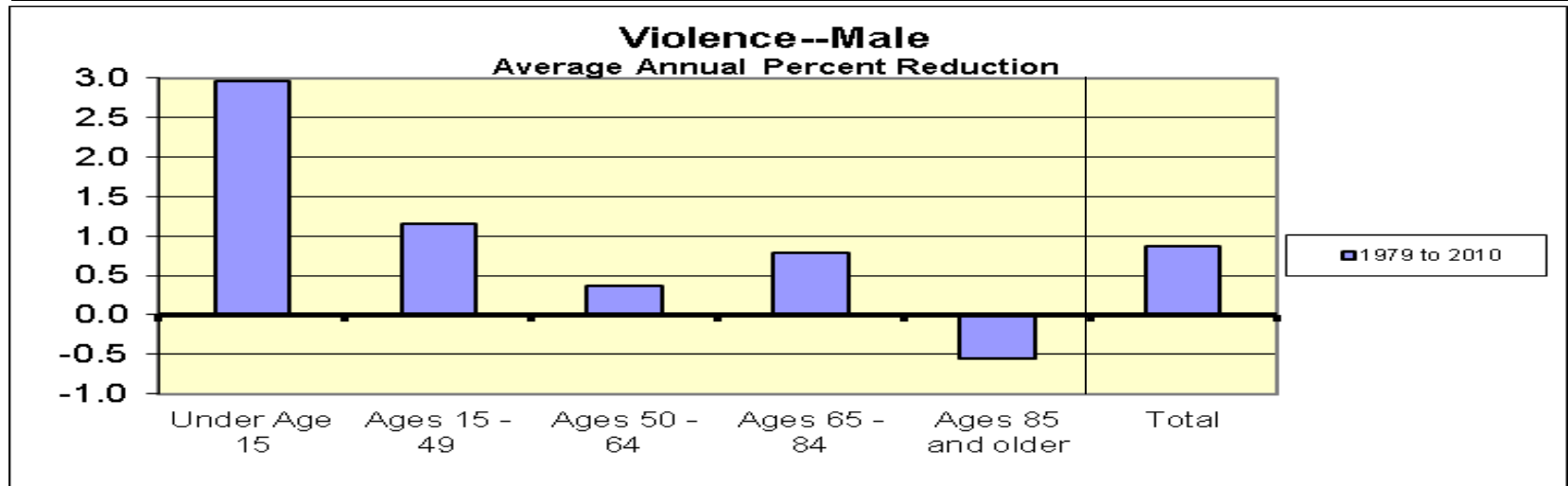
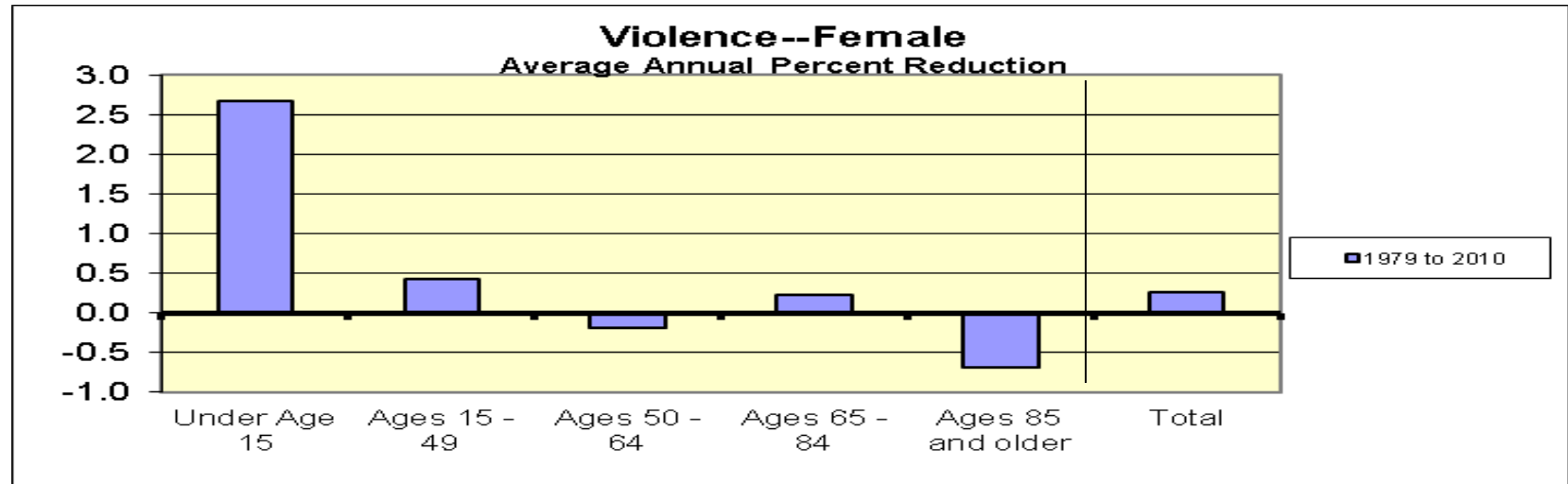


Cancer advances recently at younger ages

But increased death rates at high ages

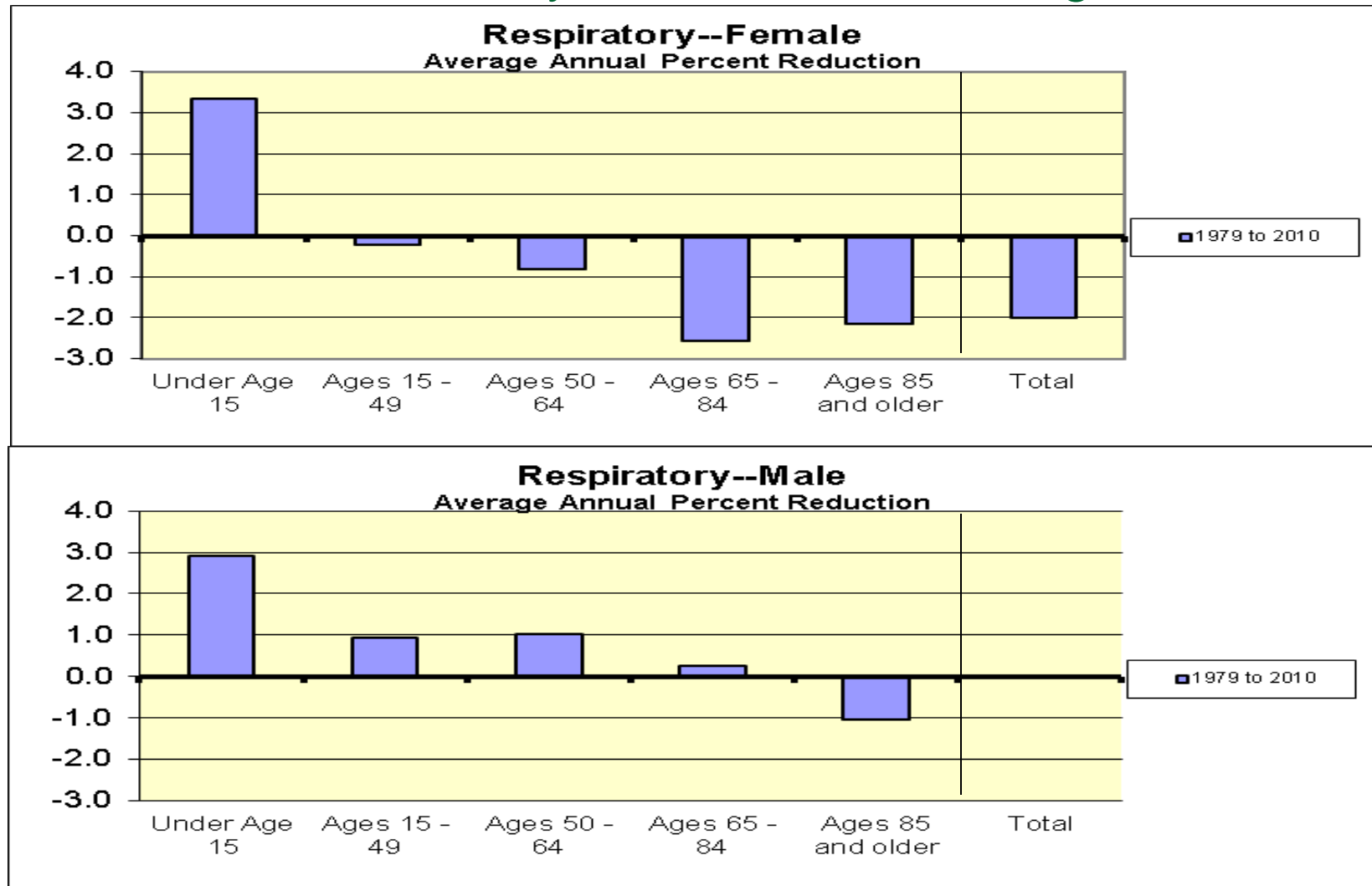


Violence improving at young ages But worsening at very high ages



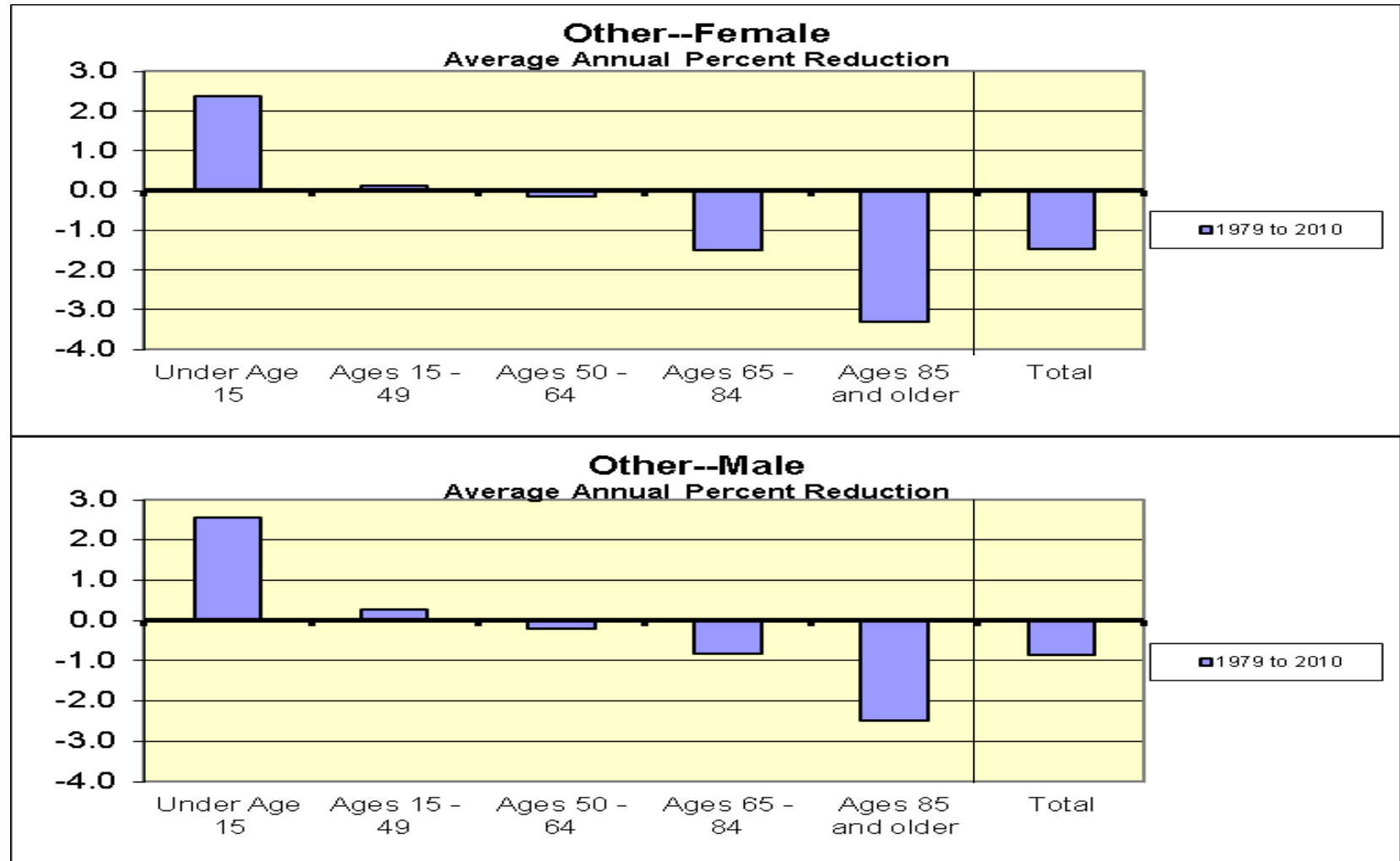
Respiratory worsening over last 30 years

Particularly for women—smoking

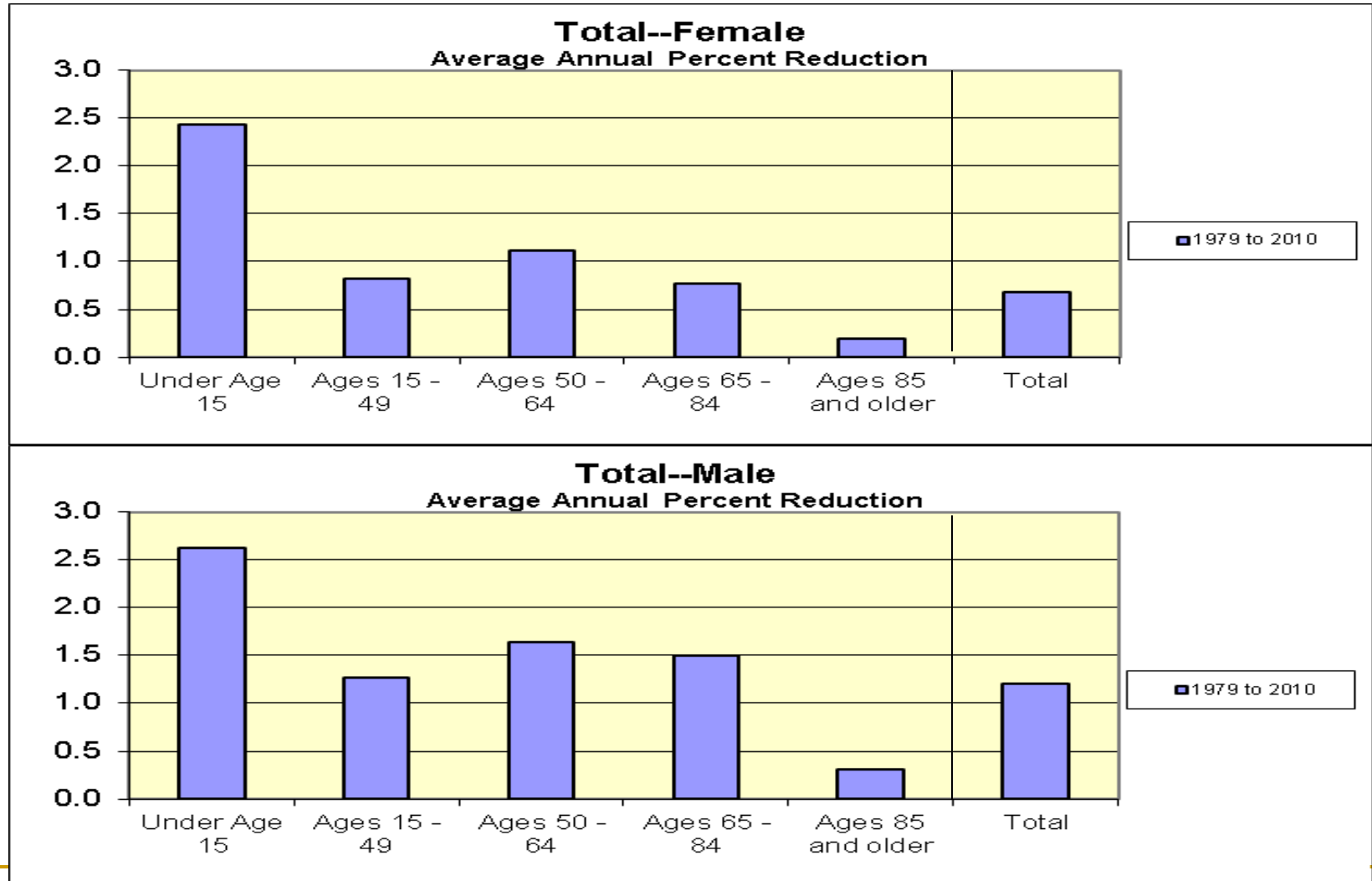


“Other” causes—historically problematic

Reflects new issues and complications that arise



Total All Causes—age gradient affected by strong reductions in Cardiovascular at 50-84



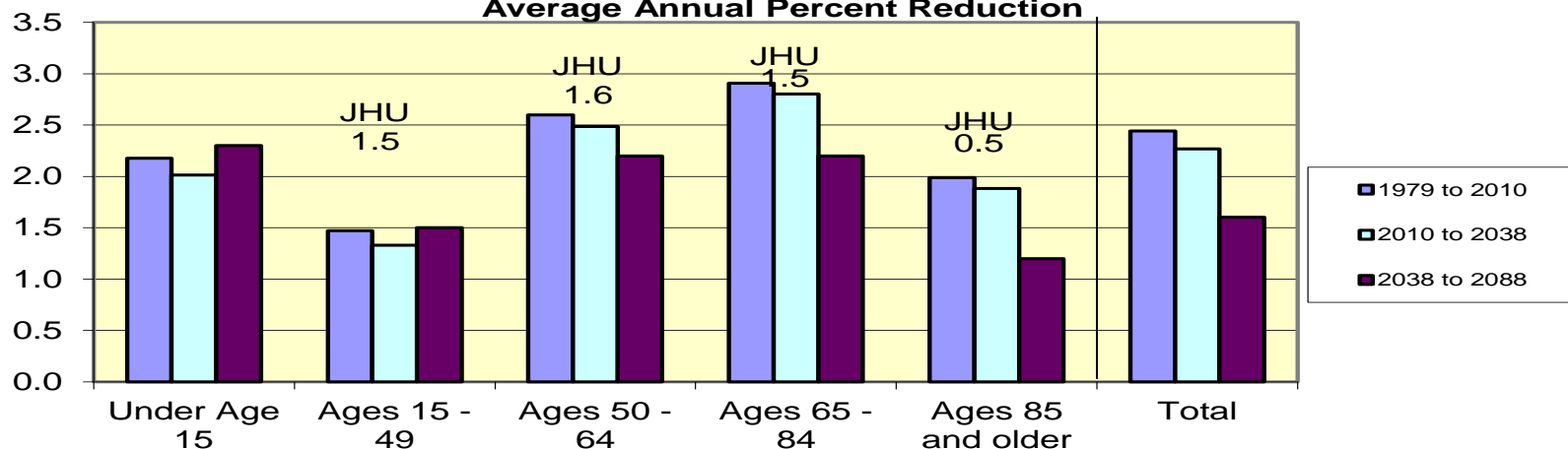
So, how about the future?

SSA OCACT / Trustees expectations

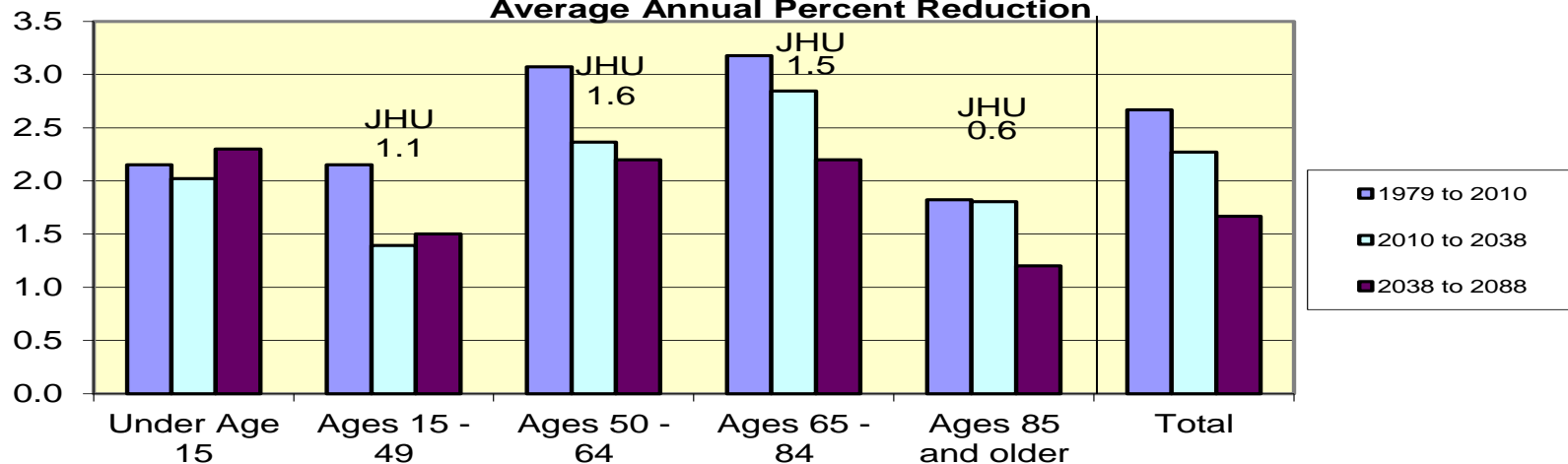
- Must anticipate future conditions
 - Smoking
 - Obesity
 - Medical technology
 - Cost of applying best practice/advances to all
 - Spending on medical will decelerate in the US
- A matter of judgment
 - Improved by considering cause groups
 - Johns Hopkins experts—a new voice

Cardiovascular still strong but decelerating: *JHU experts less optimistic*

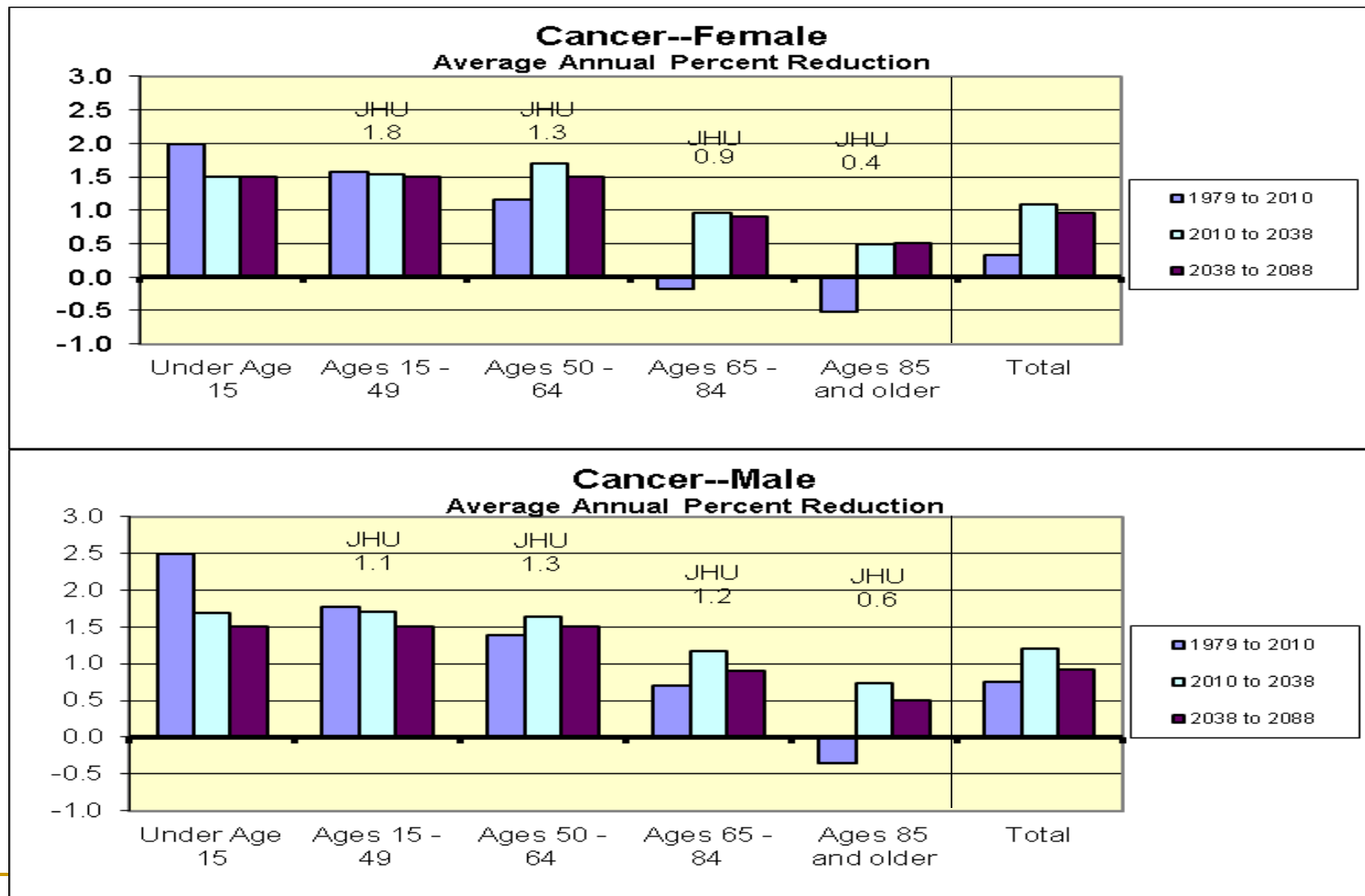
Cardiovascular Disease--Female
Average Annual Percent Reduction



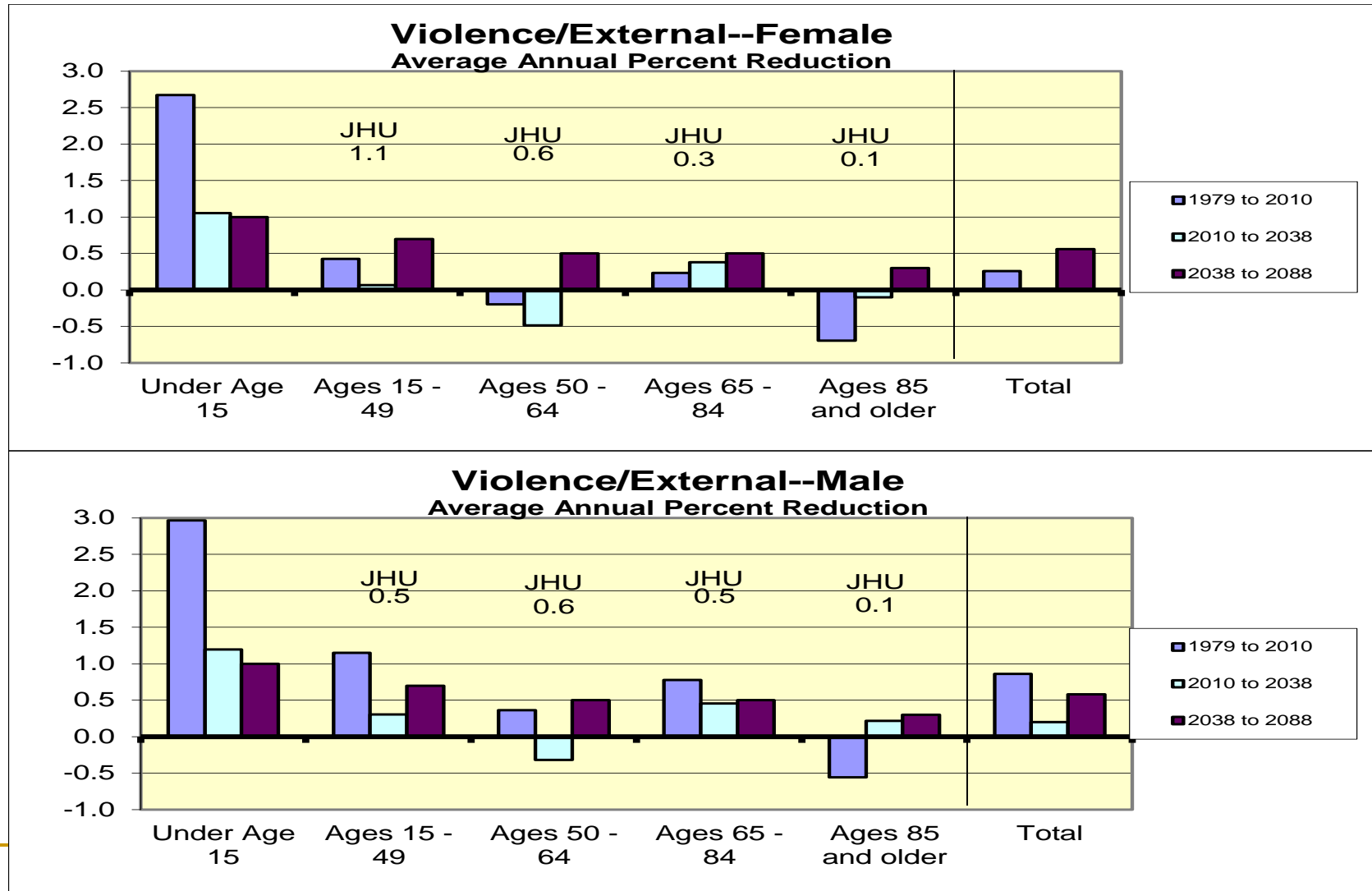
Cardiovascular Disease--Male
Average Annual Percent Reduction



Cancer improvement very recently—expect continued improvement—*JHU experts very similar!*

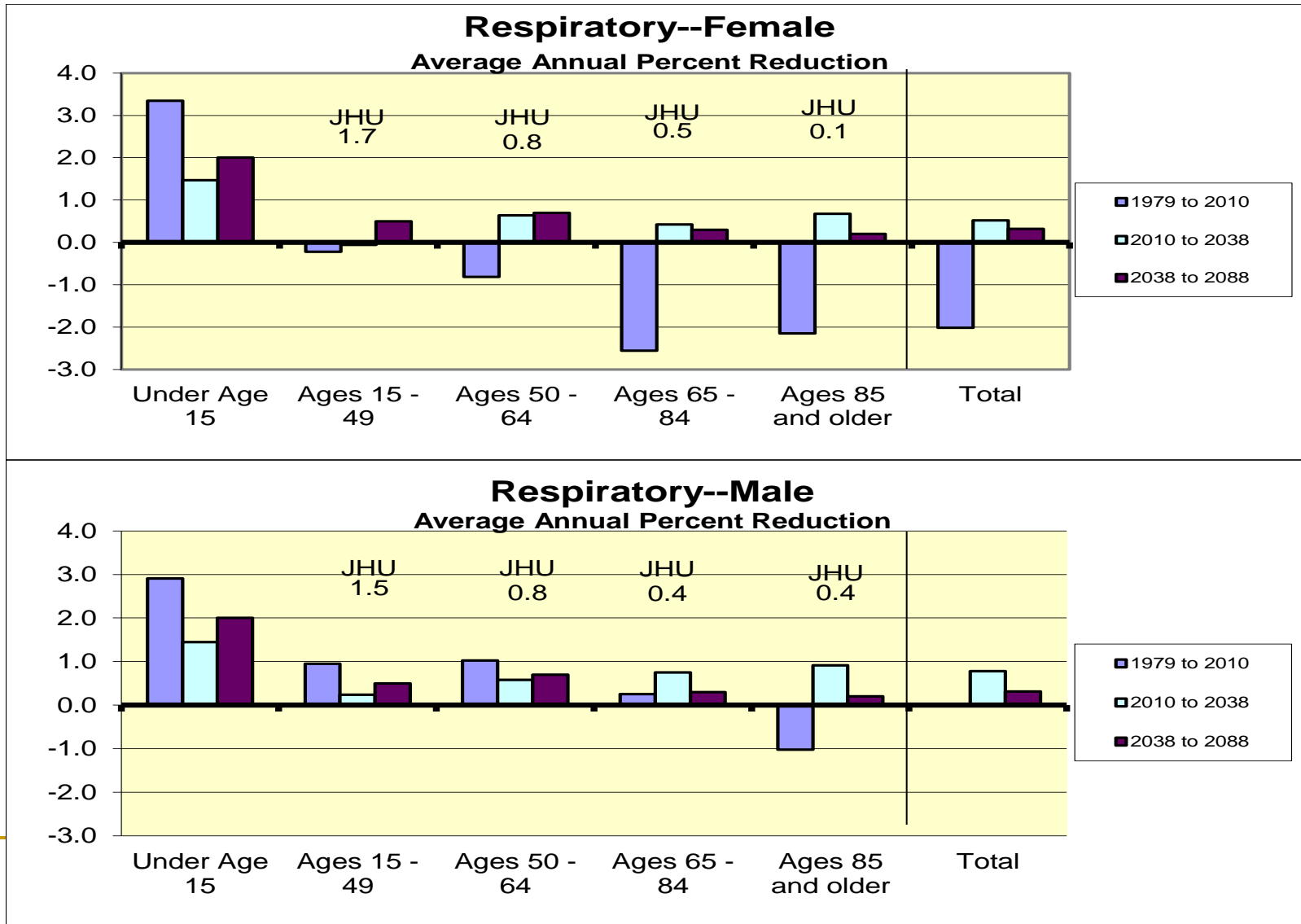


Violence worsened very recently—but improves ultimately for all: *JHU a bit more optimistic*



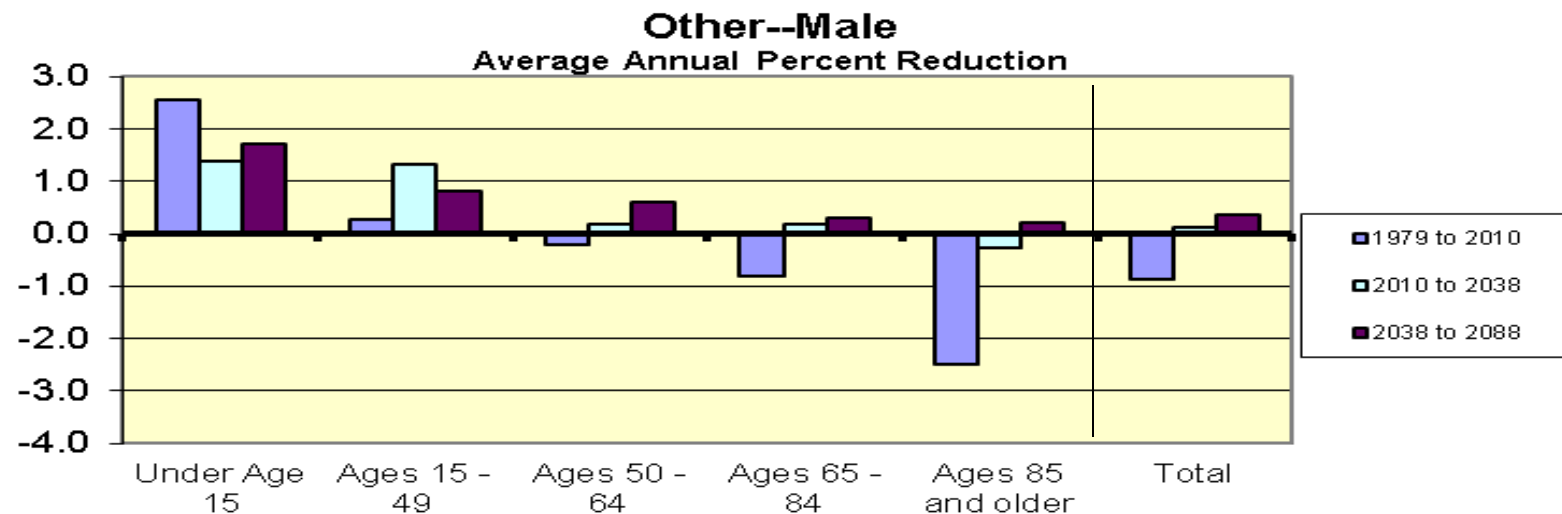
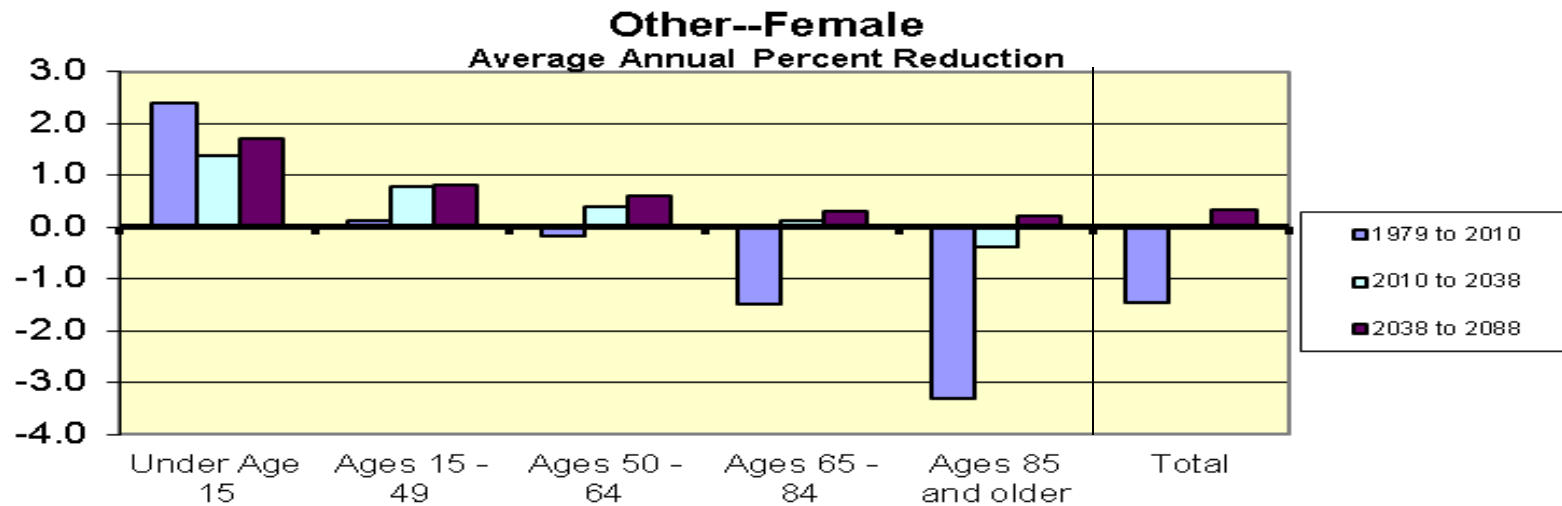
Respiratory—females improve post-smoking

JHU experts less optimistic at highest ages

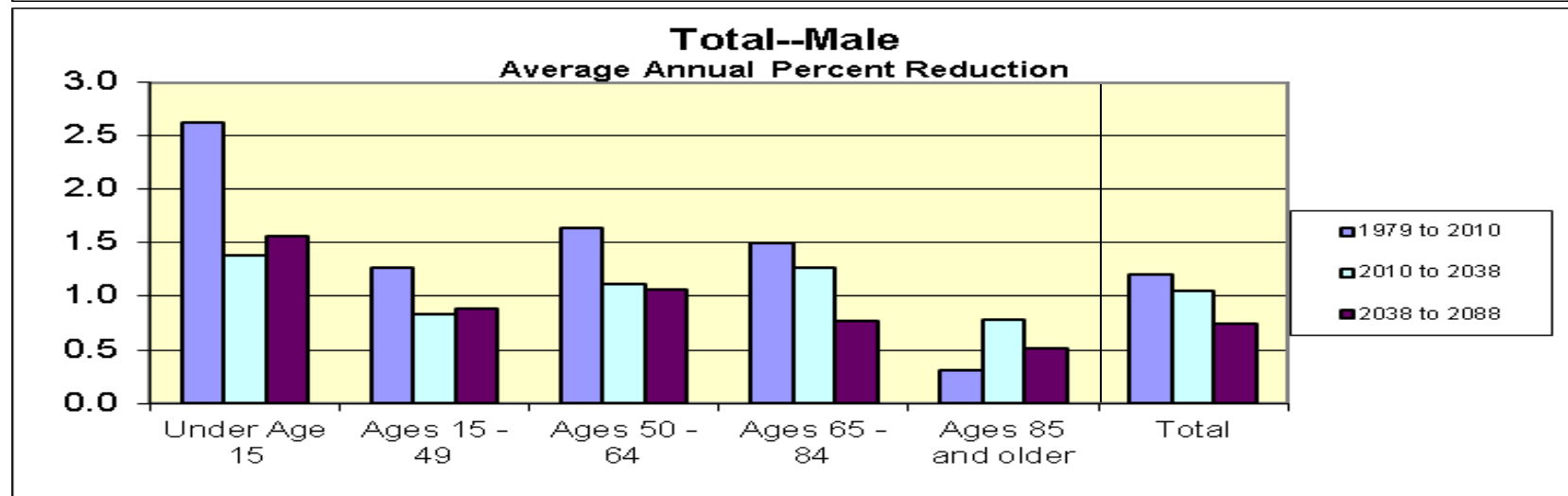
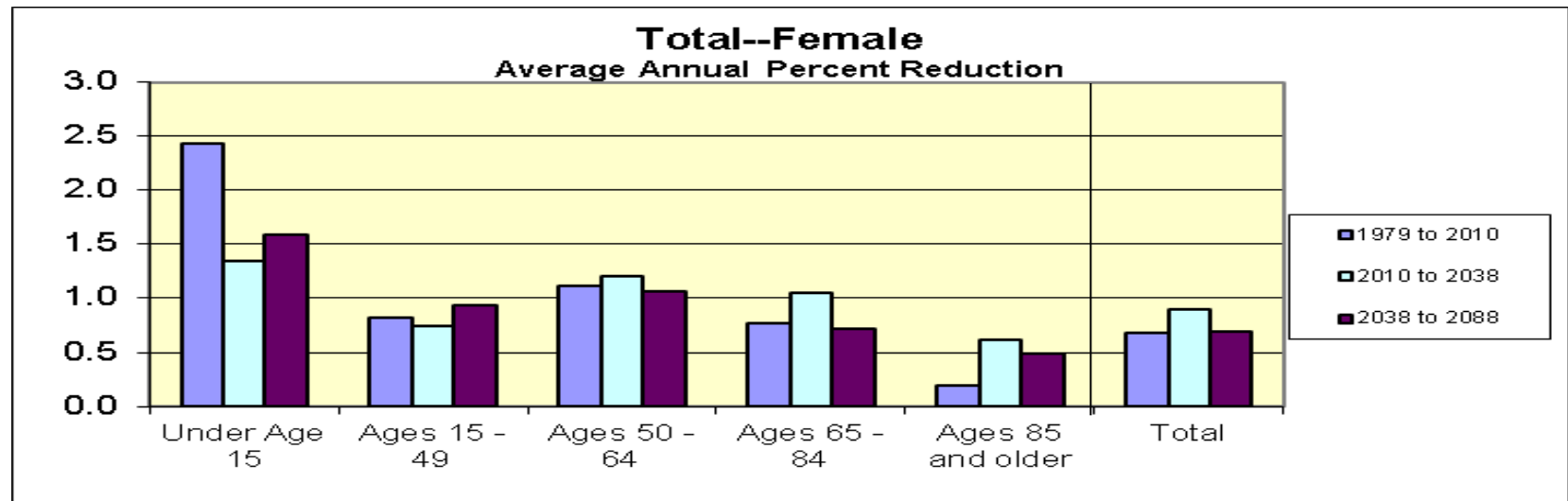


Other Causes (including new ones)

Assume change to modest improvement for all

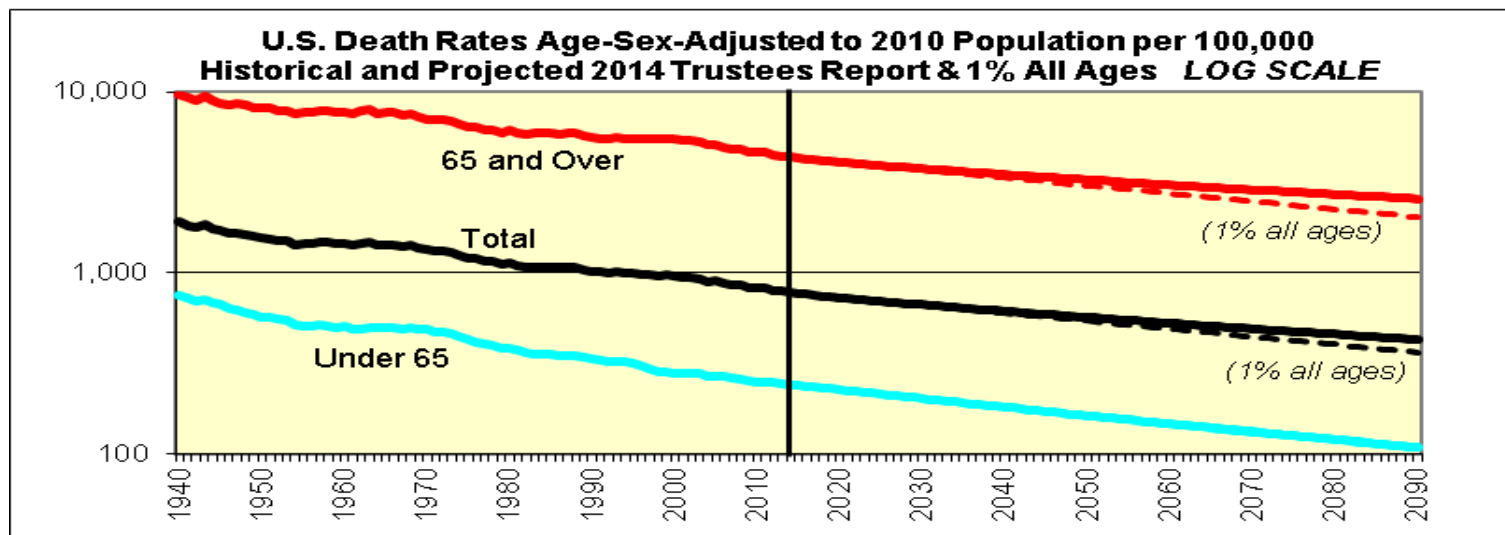
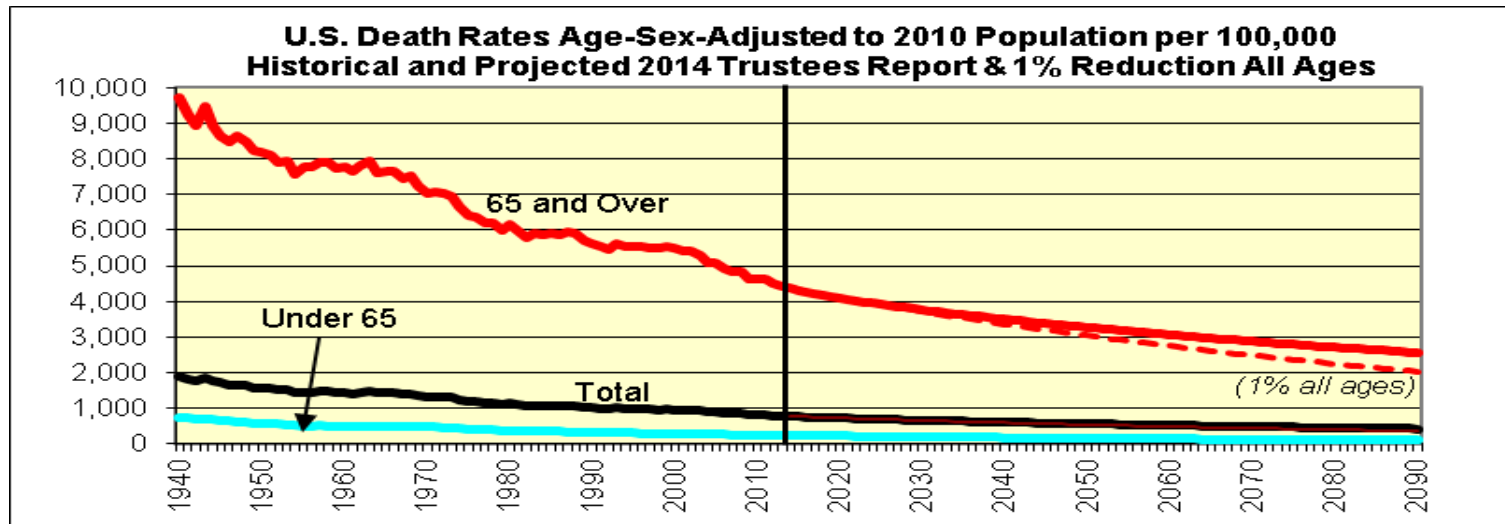


Total All Causes—less gradient by age than in the past (but not 0)—more improvement at ages 85+



So, death rates will continue to decline: How fast?

Analysis by cause and conditions suggests some deceleration



Bottom Line

- Mortality reductions will continue
 - Future generations will live longer
- But it will be hard to match the effects of:
 - Antibiotics and vaccines
 - Increased general standard of living
 - Medicare/Medicaid
 - The vast increase in health spending, etc.
 - And possibly even to maintain these effects
 - **Improvement in death rates will decelerate**
- Age gradient of improvement will continue
 - We cannot eliminate death over age 85!
- Mortality improvement by age and cause is critical

For much more detail go to:

- The 2014 OASDI Trustees Report
 - <http://www.ssa.gov/oact/TR/2014/index.html>
- Documentation of demographic assumptions
 - http://www.ssa.gov/oact/TR/2014/2014_Long-Range_Demographic_Assumptions.pdf
- Actuarial notes and studies
 - <http://www.ssa.gov/oact/NOTES/actnote.html>
 - <http://www.ssa.gov/oact/NOTES/actstud.html>