Changes in population composition and attendant mortality regime in the United States

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Outline of Presentation

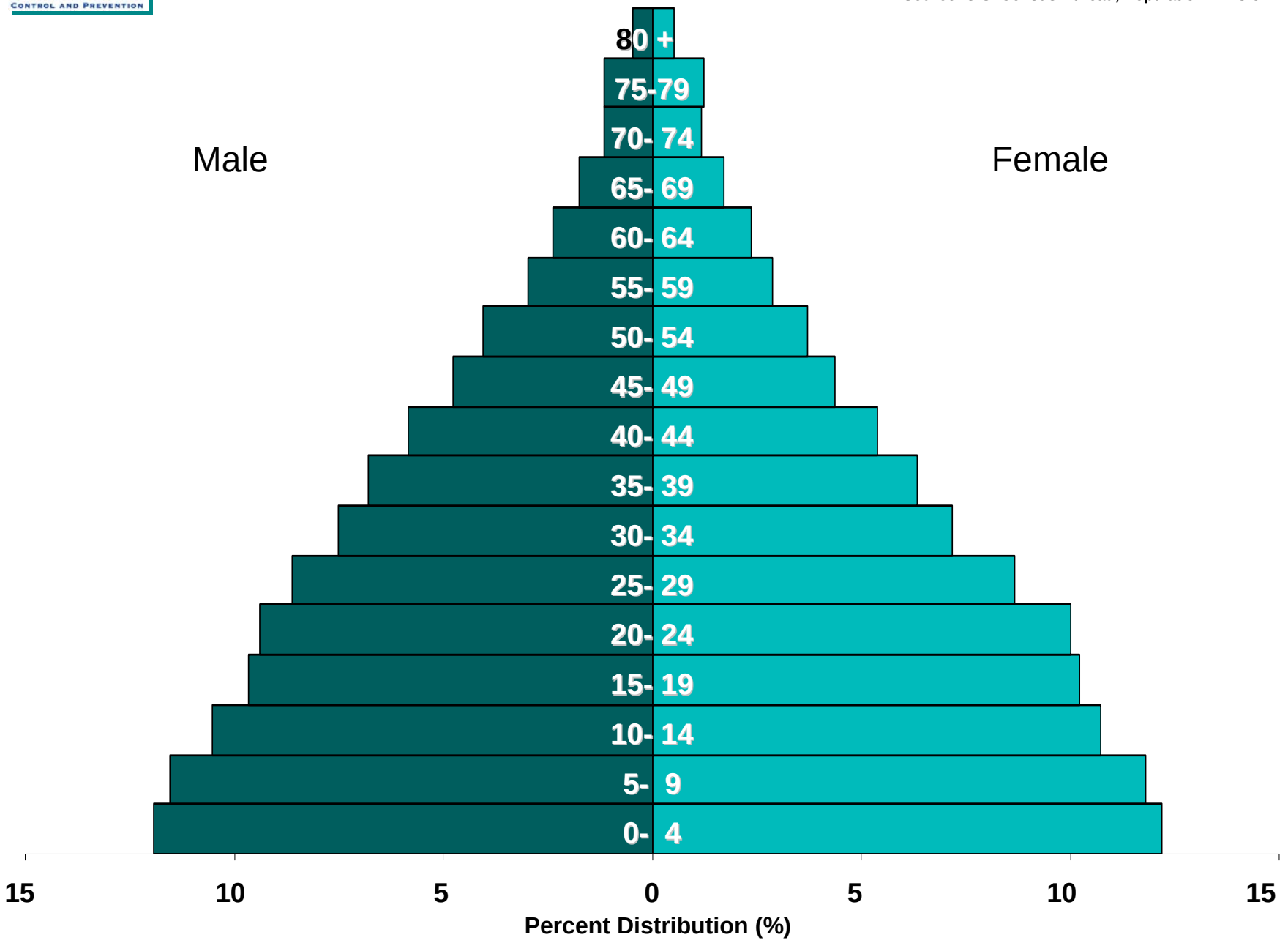
- Historical, current and projected changes in population composition
  - The aging of the US population
    - Fertility
    - Mortality
    - Immigration
- Historical, current, and projected changes in mortality patterns associated with the aging of the population
  - Changes in life expectancy, mean age at death, compression of mortality, and changes in leading causes of death
- Possible consequences to the health status and health care of the US populations that may result from the aging of the population and its concomitant mortality regime

I. Changes in Population Composition 1900-2050

- Data series dating back to 1900 reveals the steady aging of the US population
- In the next few decades the population will age more rapidly as the baby boom cohorts reach age 65
- The following graphs highlight the aging of the US population throughout the 1900-2050 period
  - Changing proportion of older population
  - Changing proportion of older population relative to other age groups

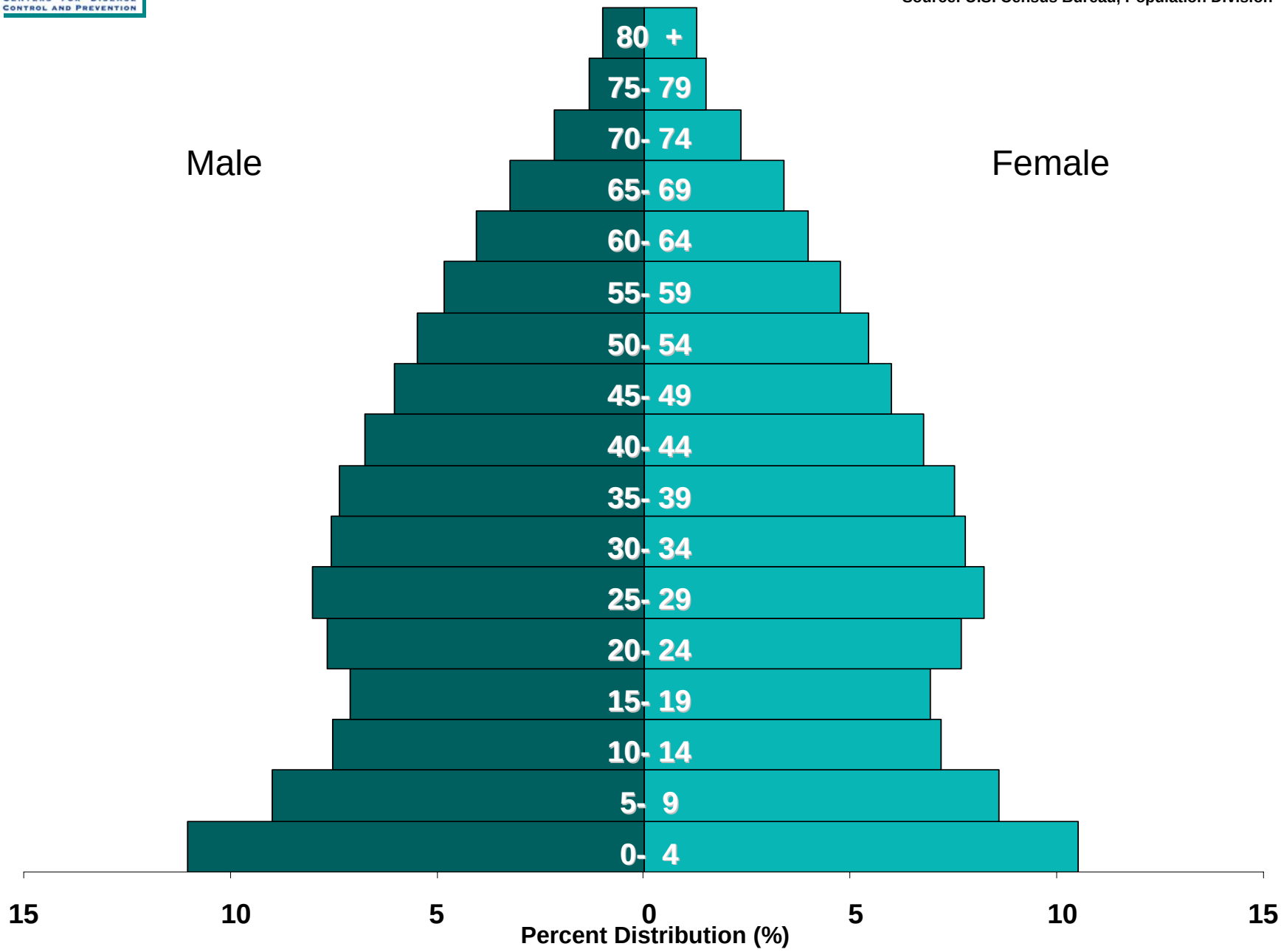
1900

Source: U.S. Census Bureau, Population Division



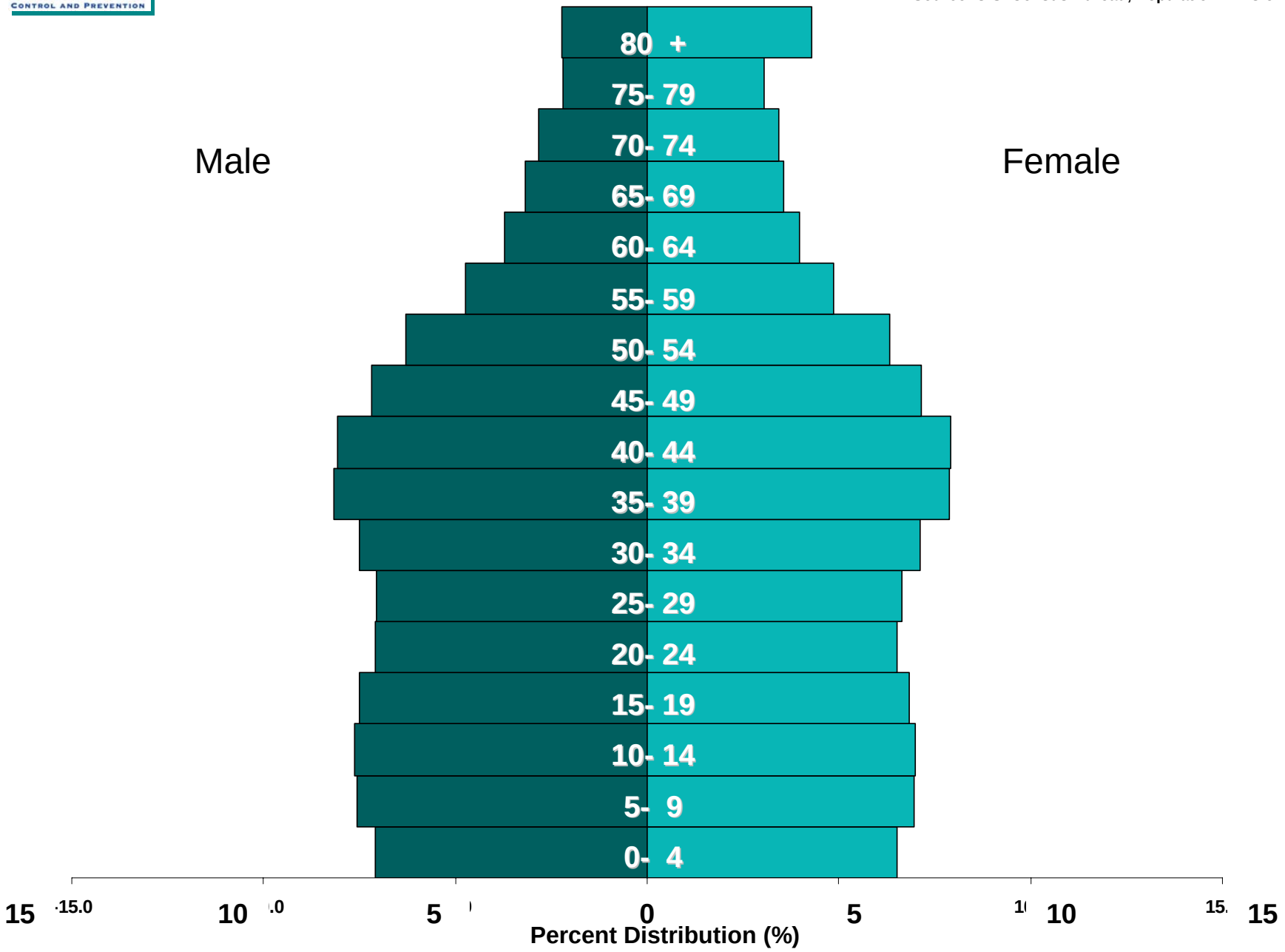
1950

Source: U.S. Census Bureau, Population Division



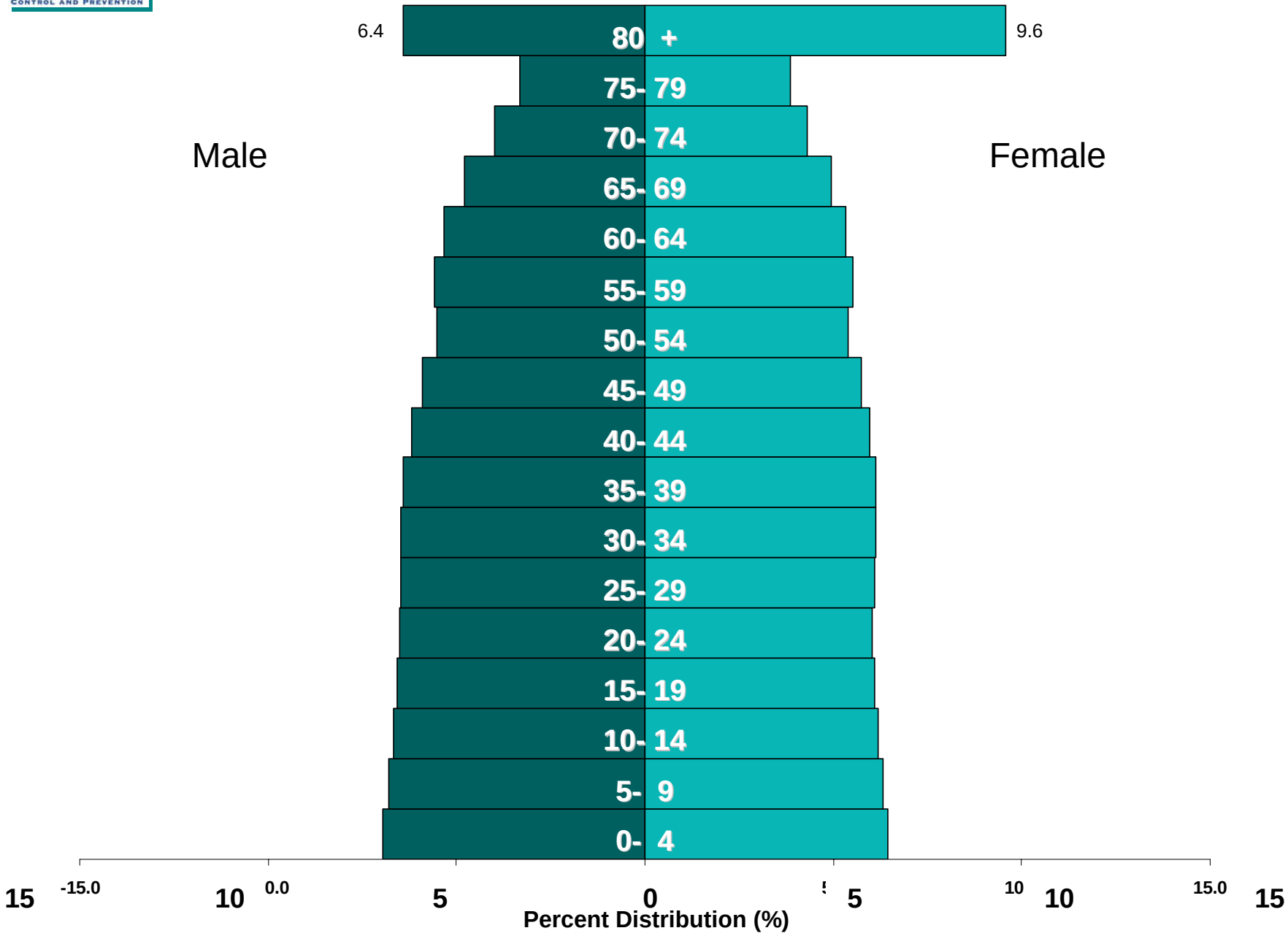
2000

Source: U.S. Census Bureau, Population Division

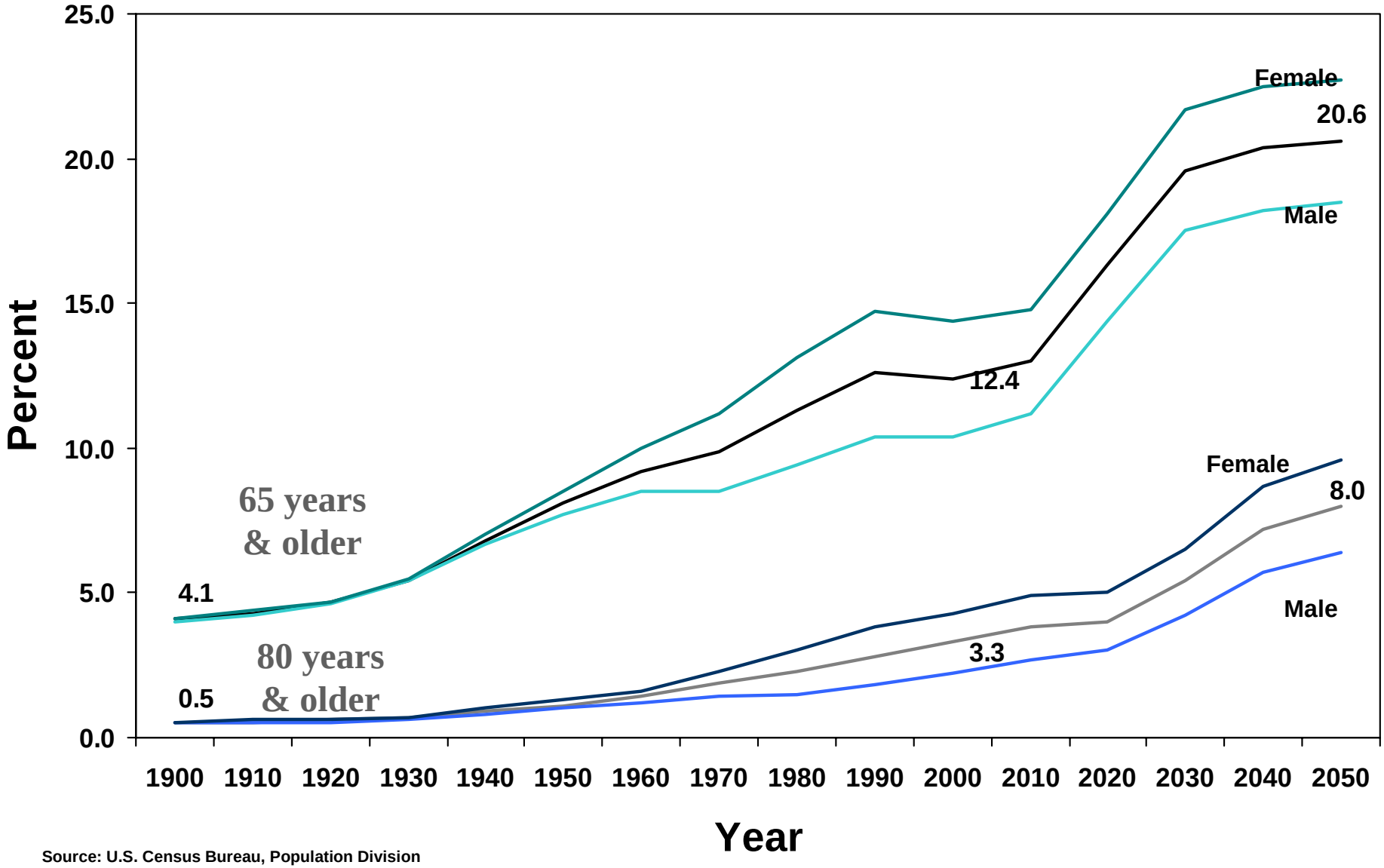


2050

Source: U.S. Census Bureau, Population Division



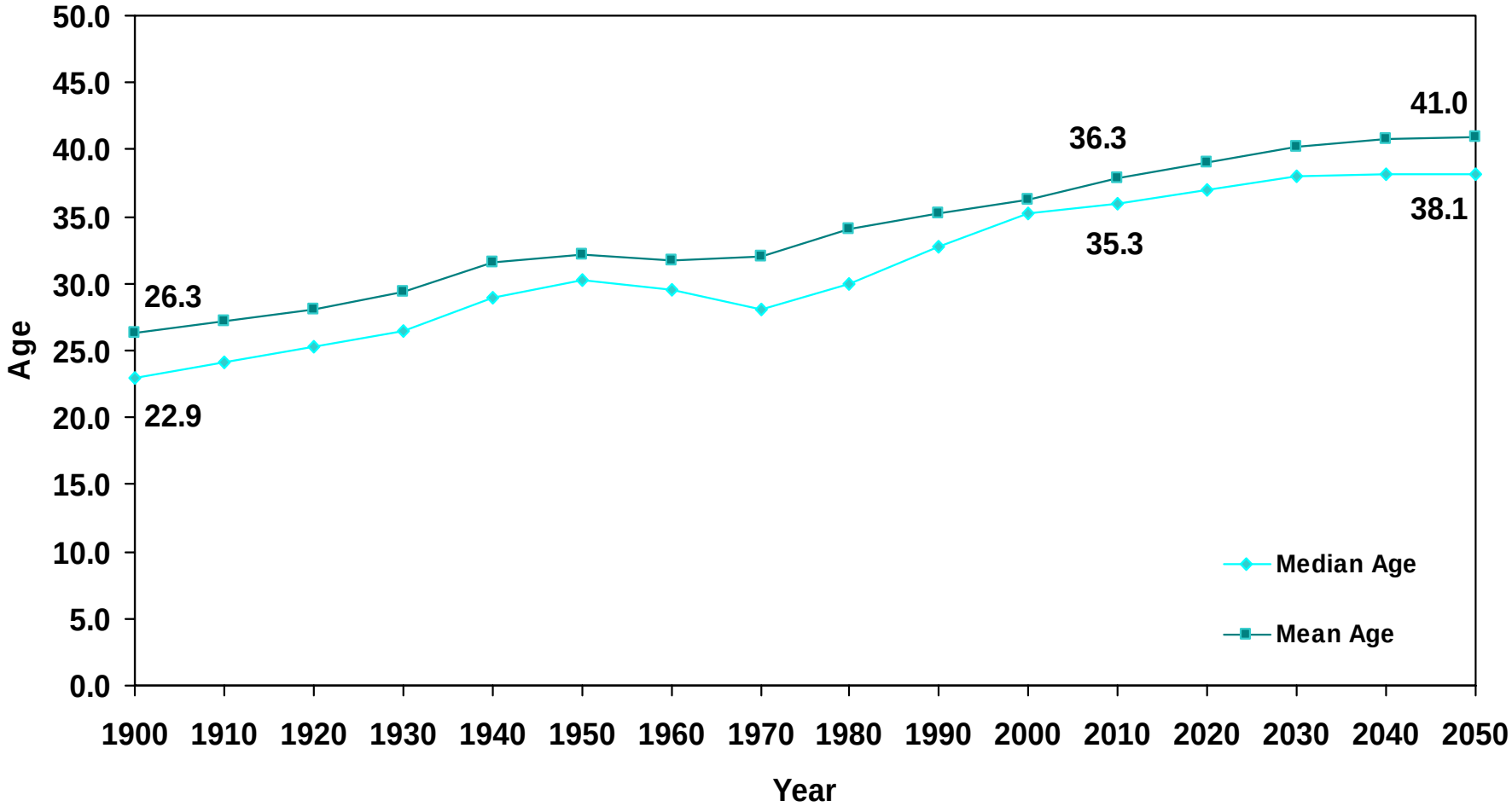
Percent distribution of older population US: 1900-2050



Source: U.S. Census Bureau, Population Division

Aging of the General Population:

Mean and Median Age, 1900-2050

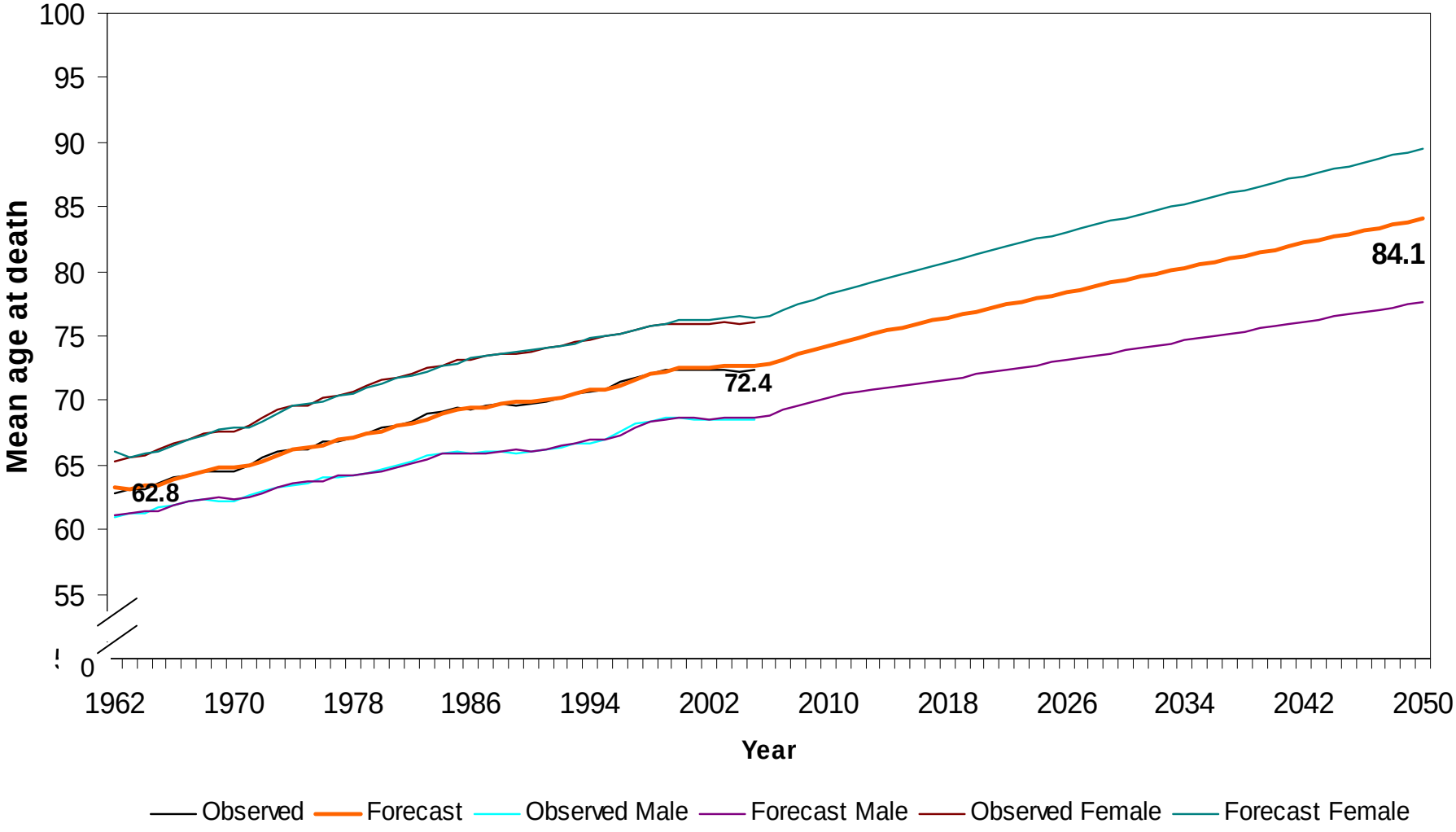


Source: U.S. Census Bureau, Population Division

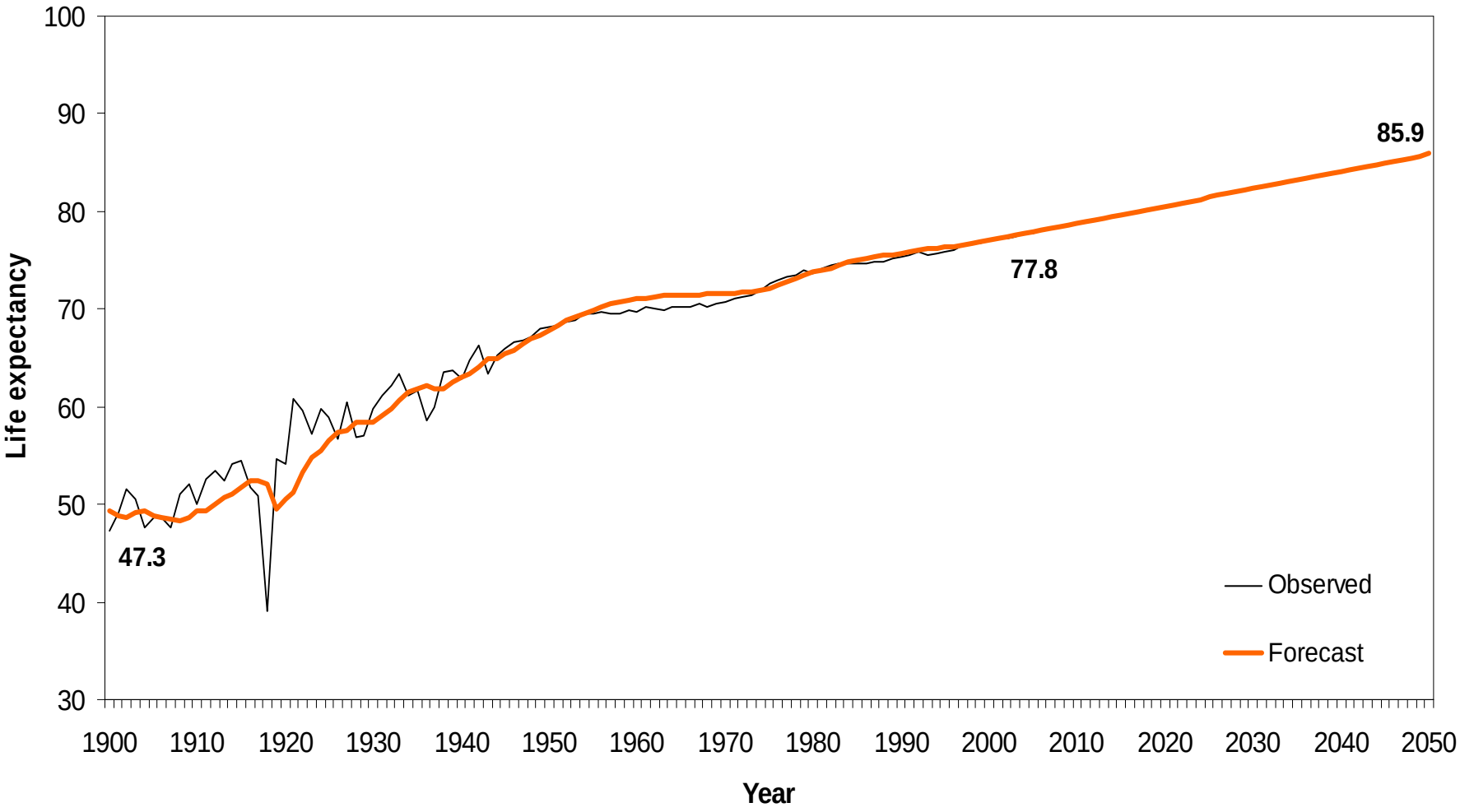
II. Changing Mortality Regime

- The aging of the US population can also be seen in the changing mortality patterns
- The following graphs highlight these changes
- Observed deaths
  - Mean age at death
- Life table measures
  - Life expectancy at birth = mean age at death in the life table stationary population
  - Age-specific survival probabilities
  - Median age at death
  - Variability of age at death = Mortality Compression
- Changes in leading causes of death

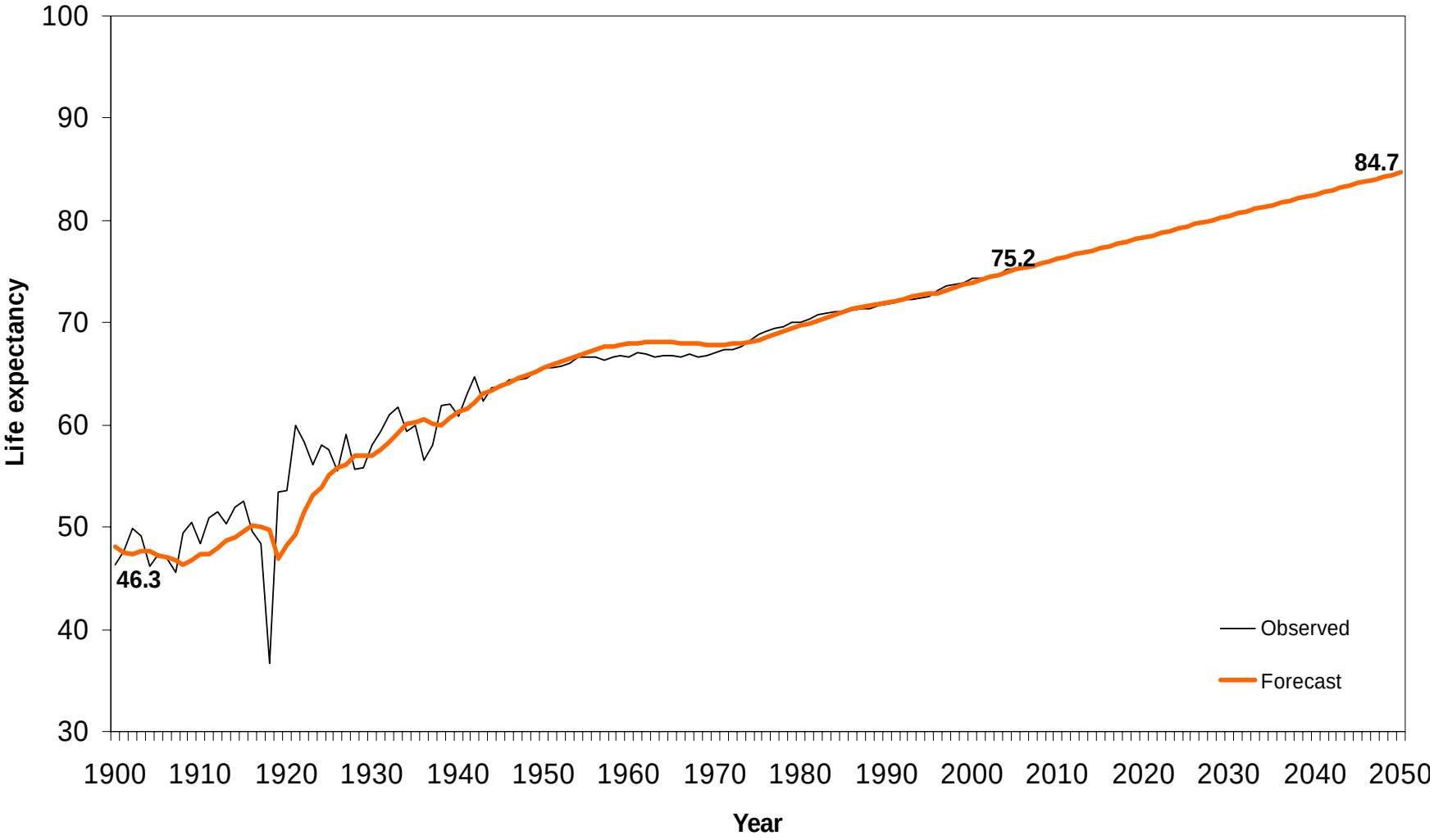
Mean Age at Death: 1962-2050



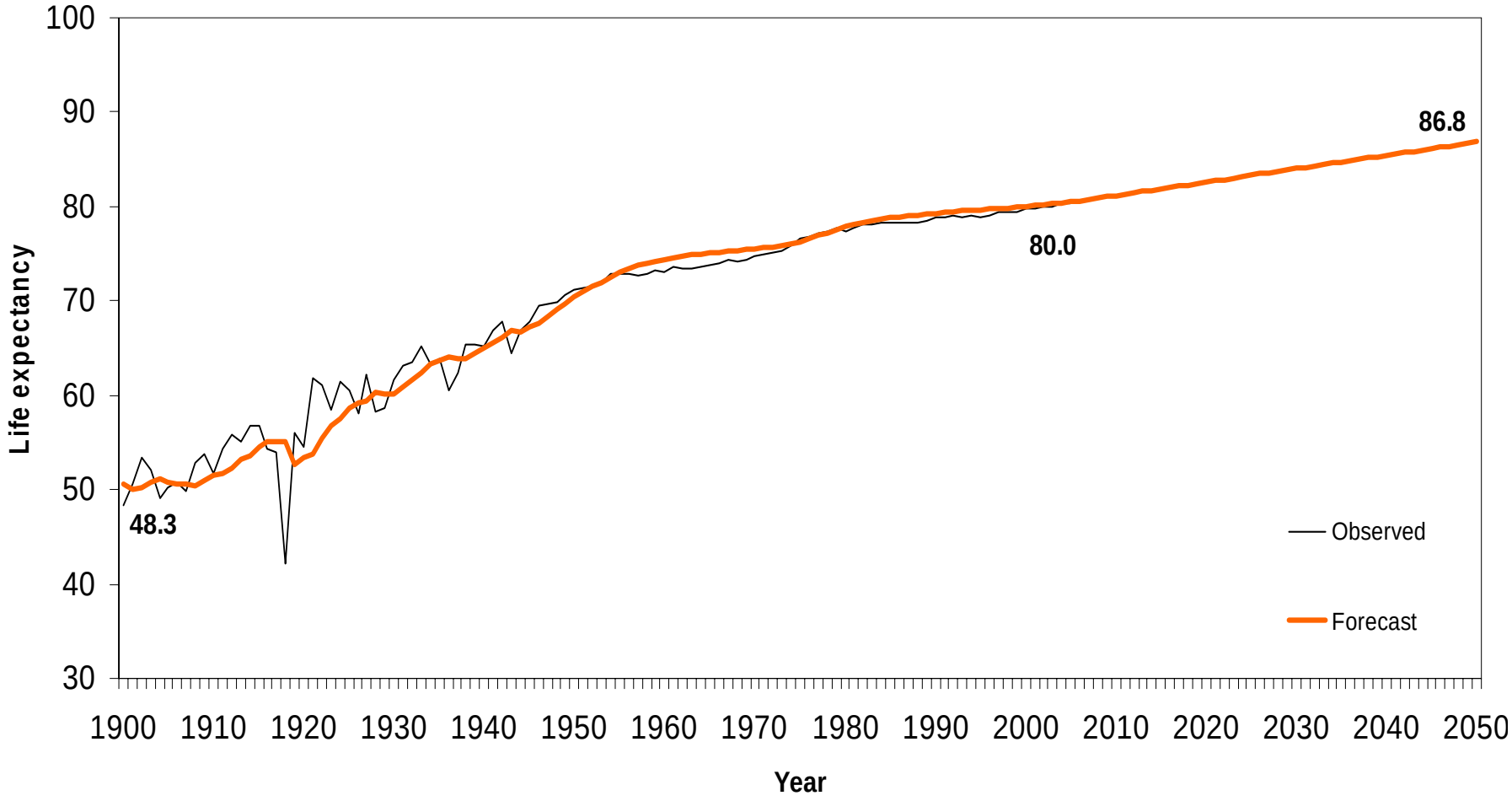
Life Expectancy at Birth, 1900-2050



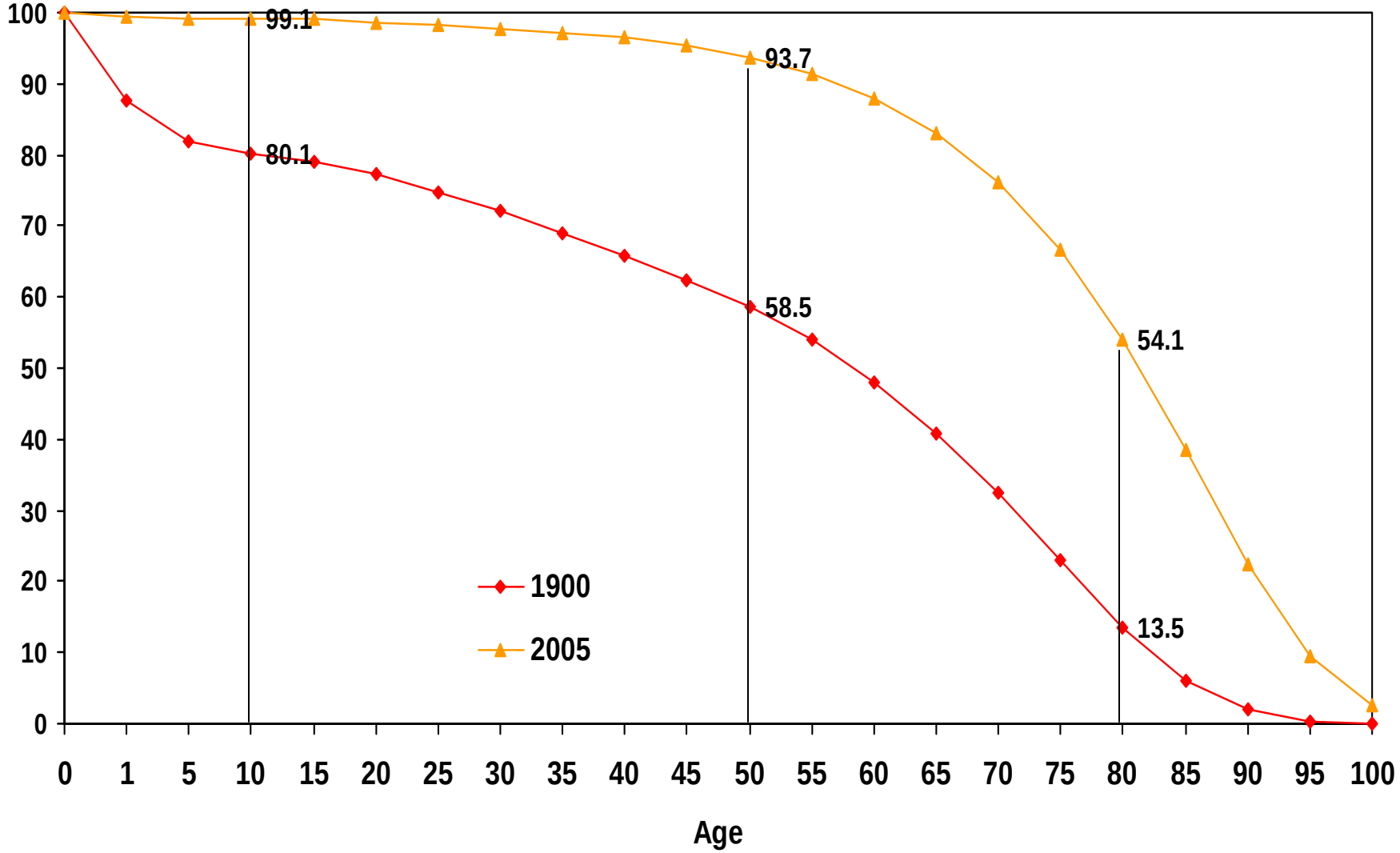
Life Expectancy at Birth, Males, 1900-2050



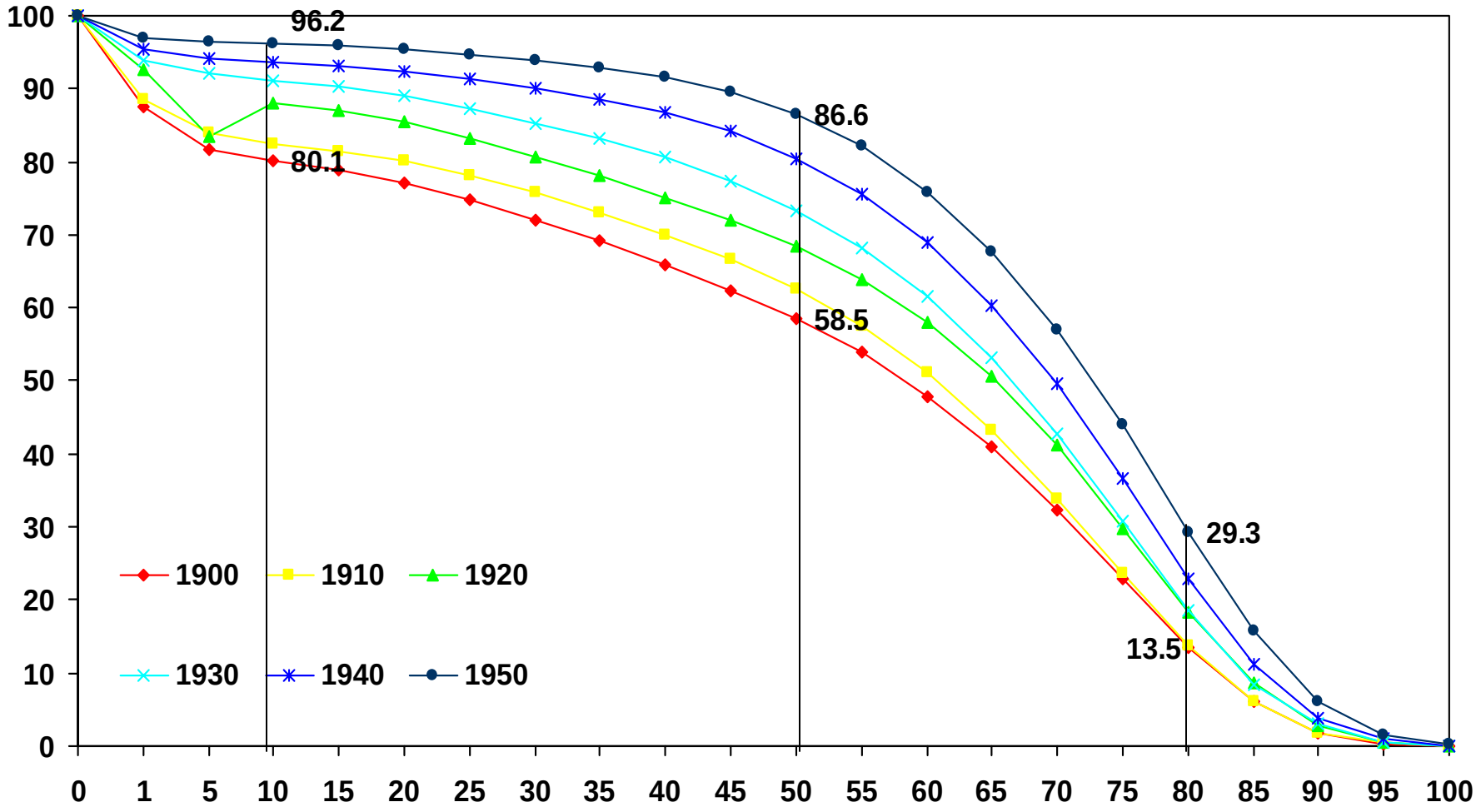
Life Expectancy at Birth, Females, 1900-2050



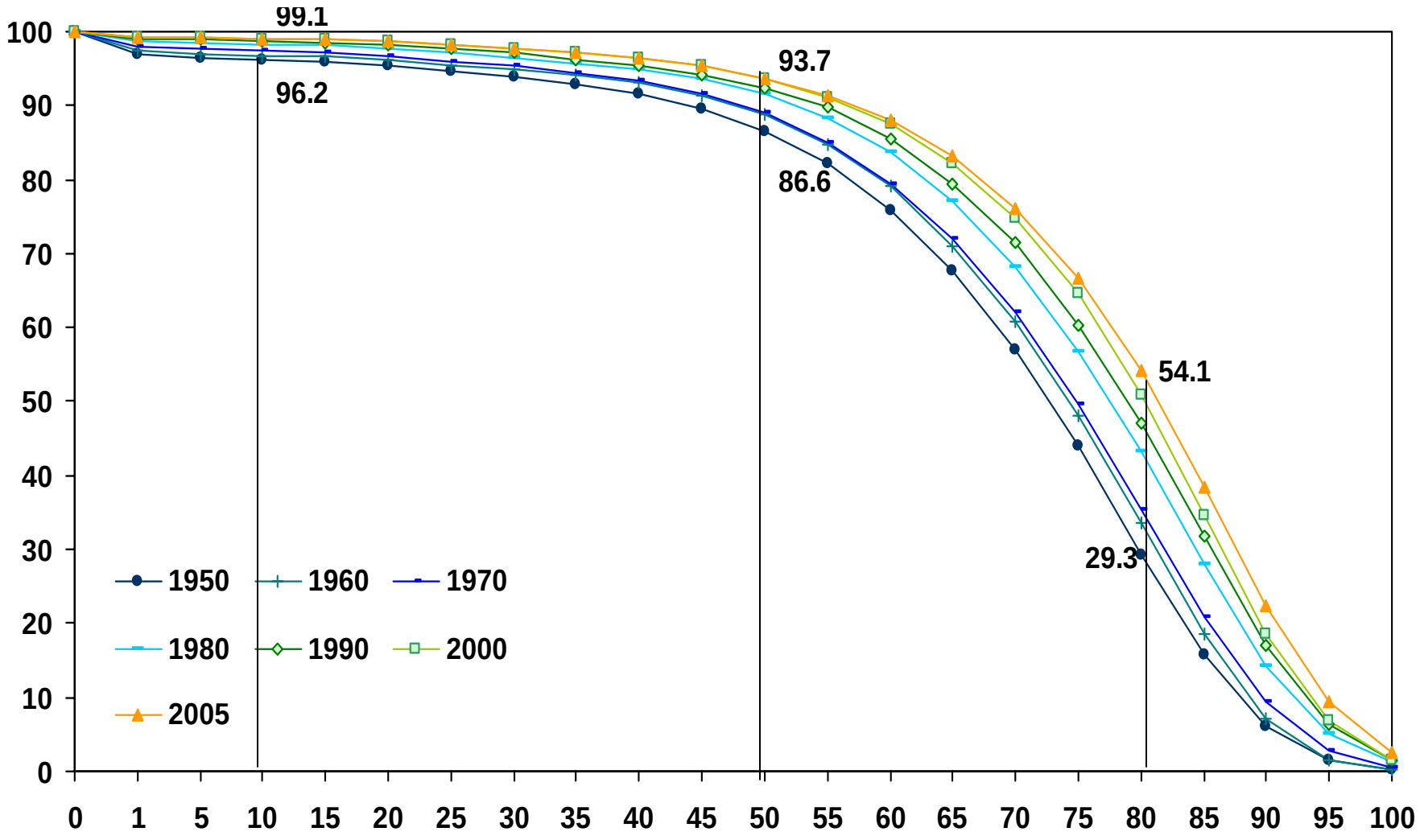
Percent surviving by age: 1900 to 2005



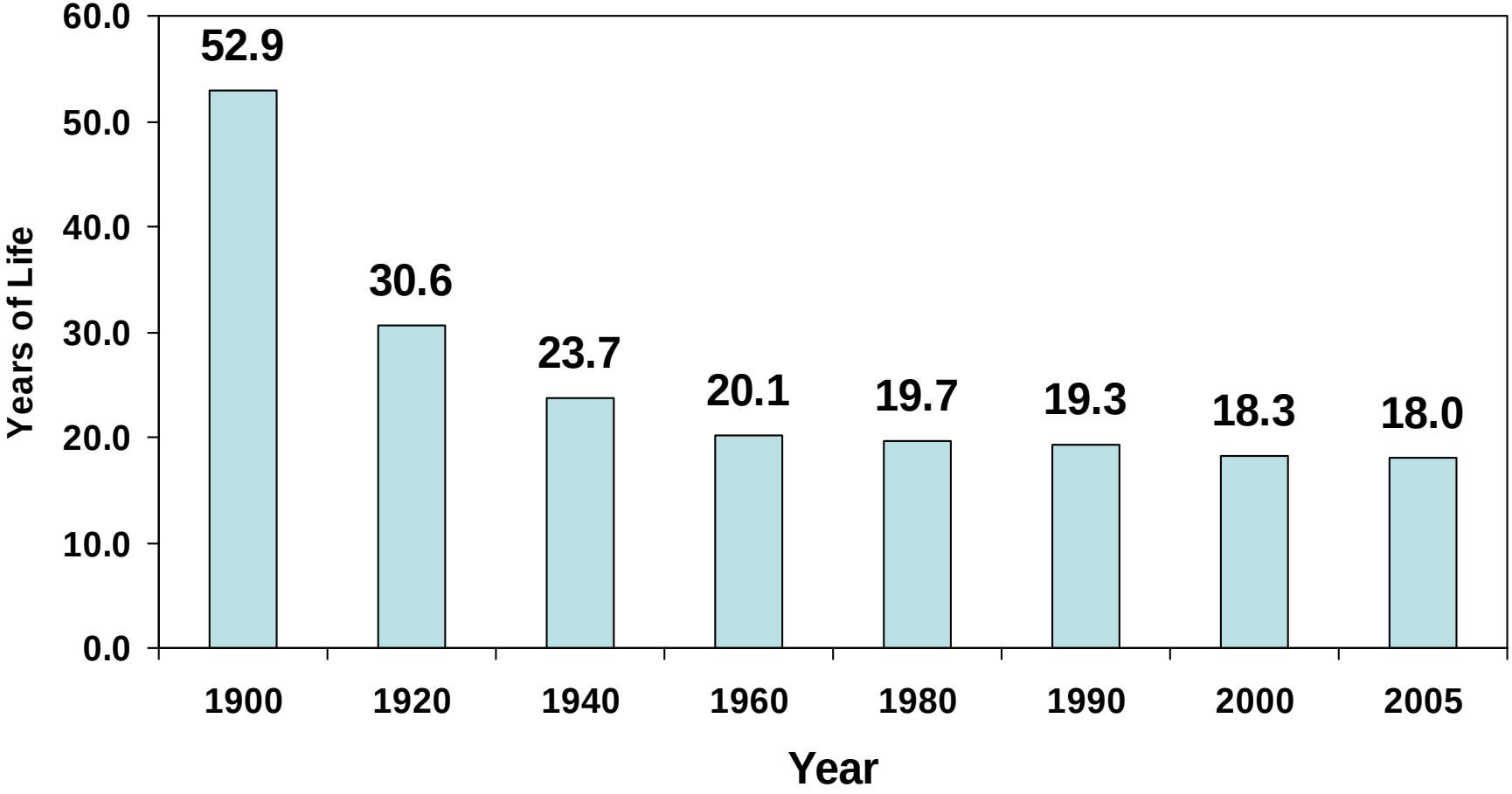
Percent surviving by age: 1900 to 1950



Percent surviving by age: 1950 to 2005



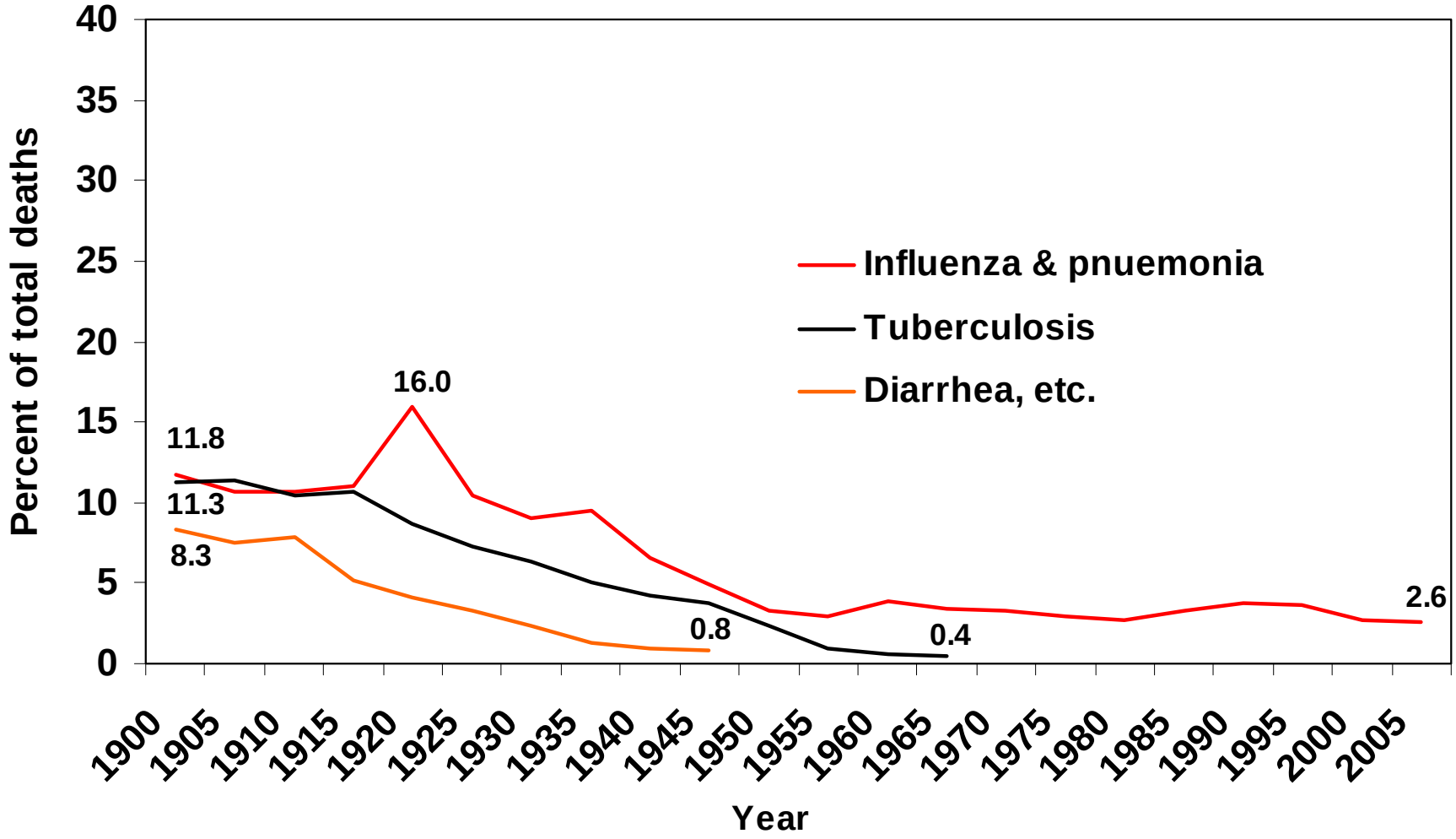
IQR of Distribution of Ages at Death



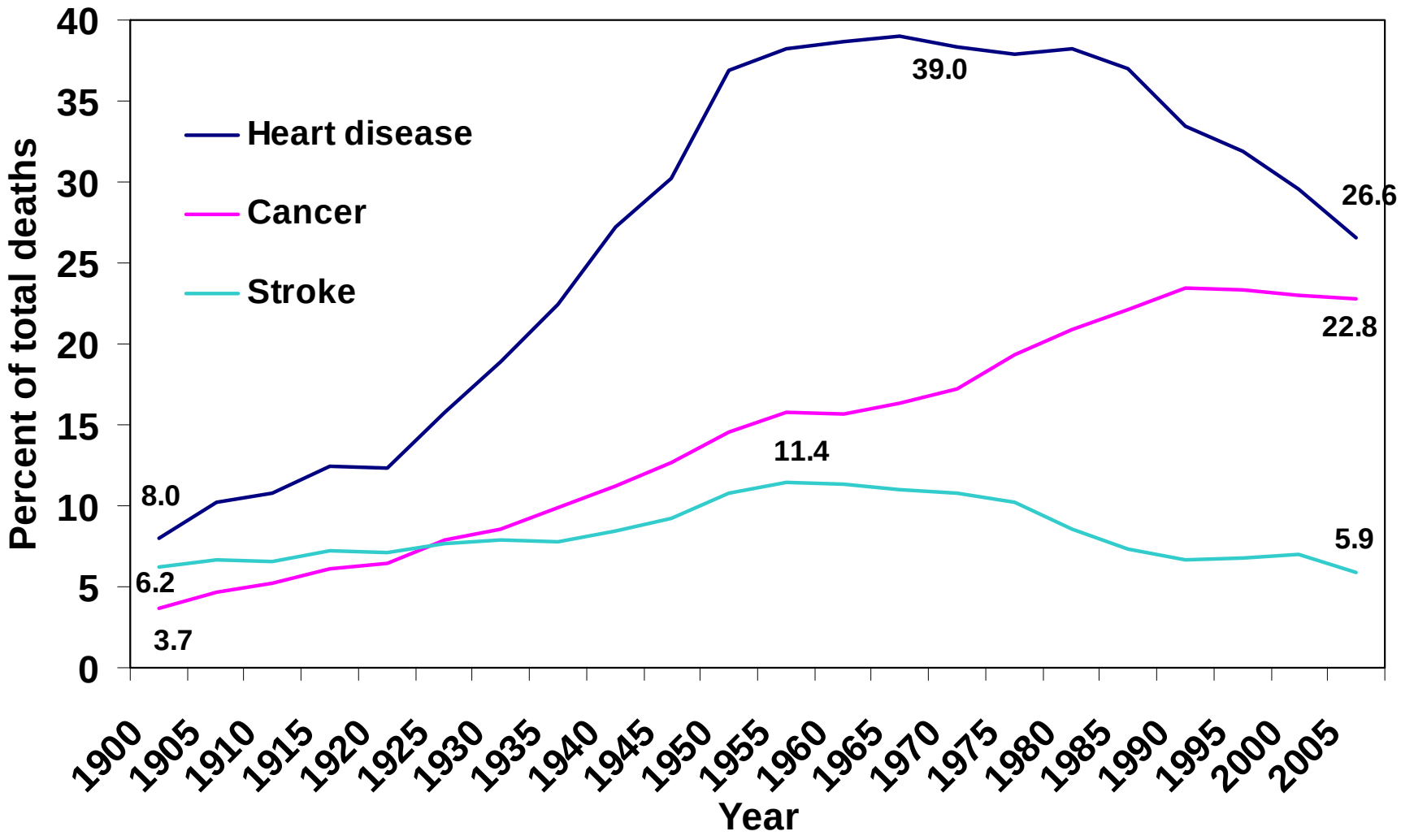
Changes in the 10 Leading Causes of Death

1900	2005
1. Influenza & Pneumonia	Heart disease
2. Tuberculosis	Cancer
3. Diarrhea	Stroke
4. Heart disease	Chronic lower respiratory diseases
5. Stroke	Accidents
6. Kidney disease	Diabetes
7. Accidents	Alzheimer's disease
8. Cancer	Influenza & Pneumonia
9. Senility	Kidney disease
10. Diphtheria	Septicemia

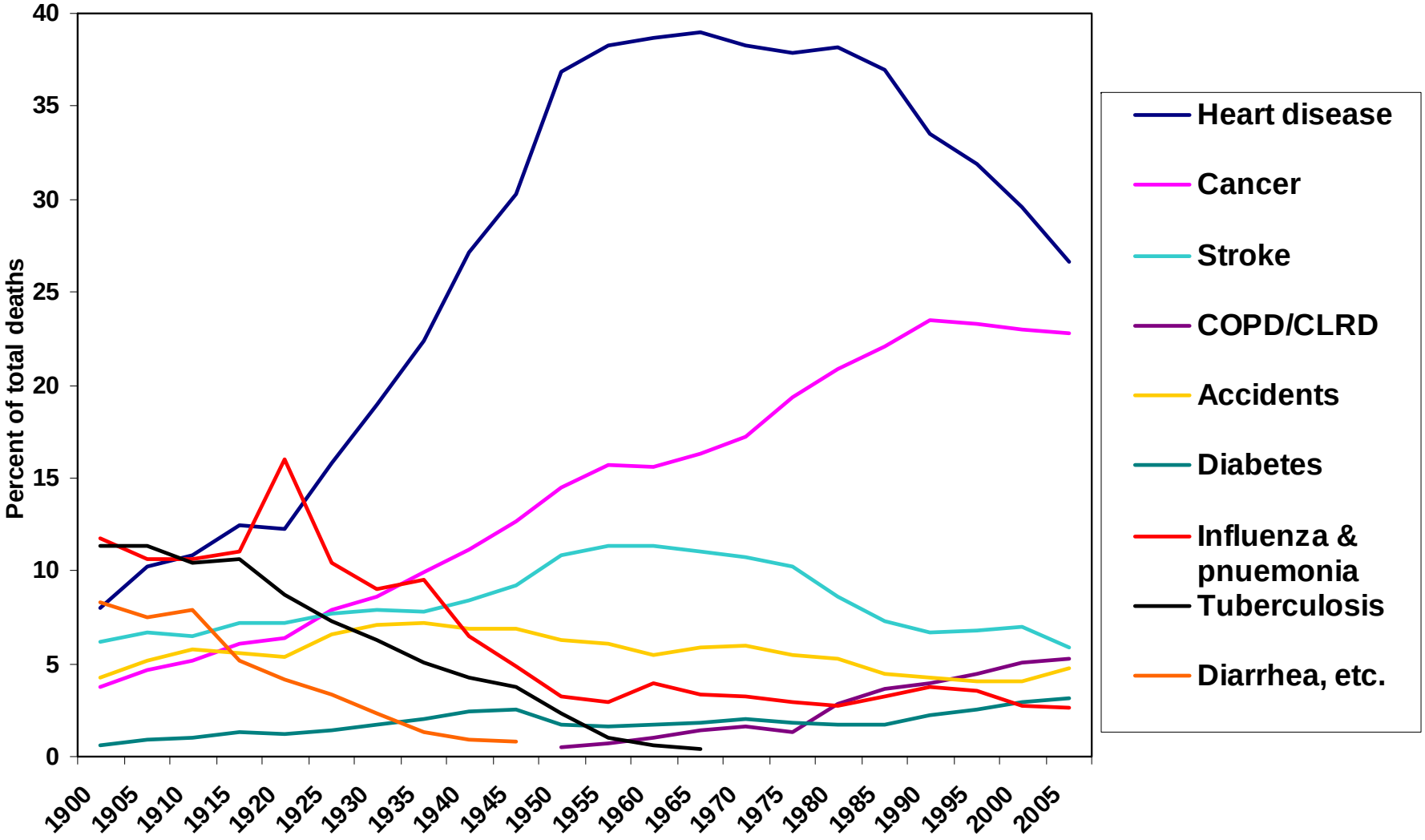
Changing Proportion of Total deaths due to Major Infectious Diseases, 1900-2005



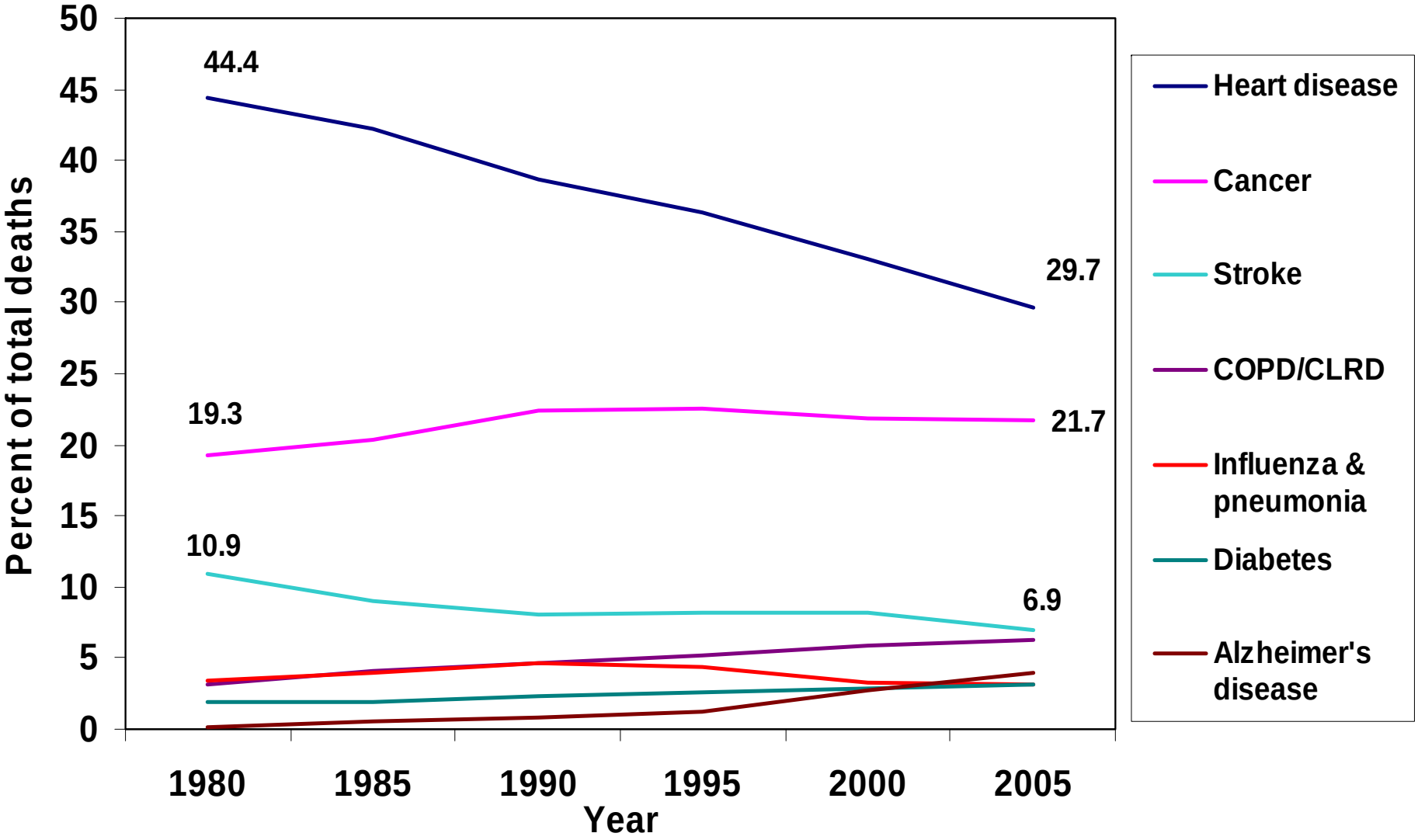
Changing Proportion of Total Deaths due to Major Chronic Diseases, 1900-2005



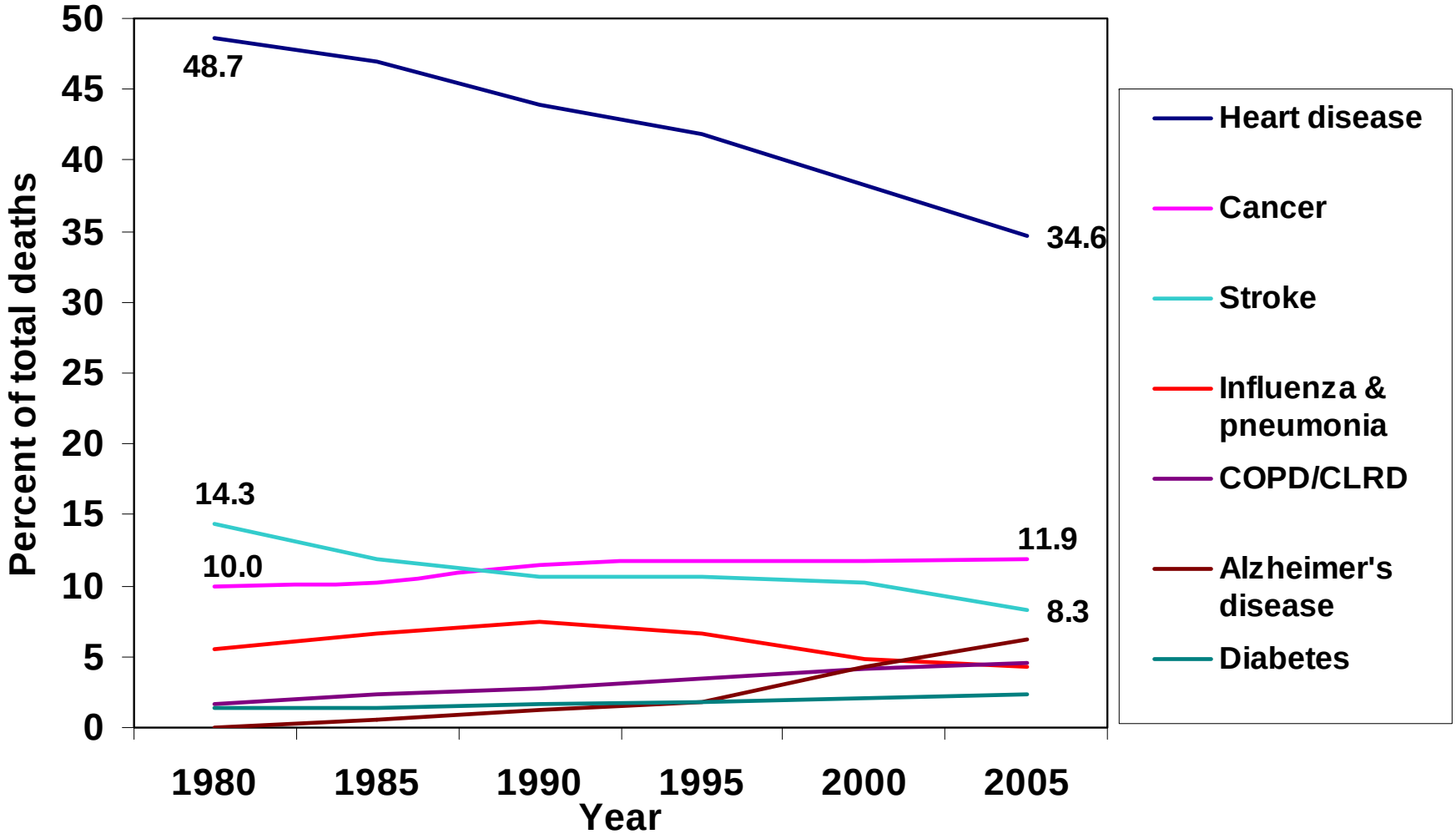
Changing Proportion of Total Deaths due to Major Causes,1900-2005



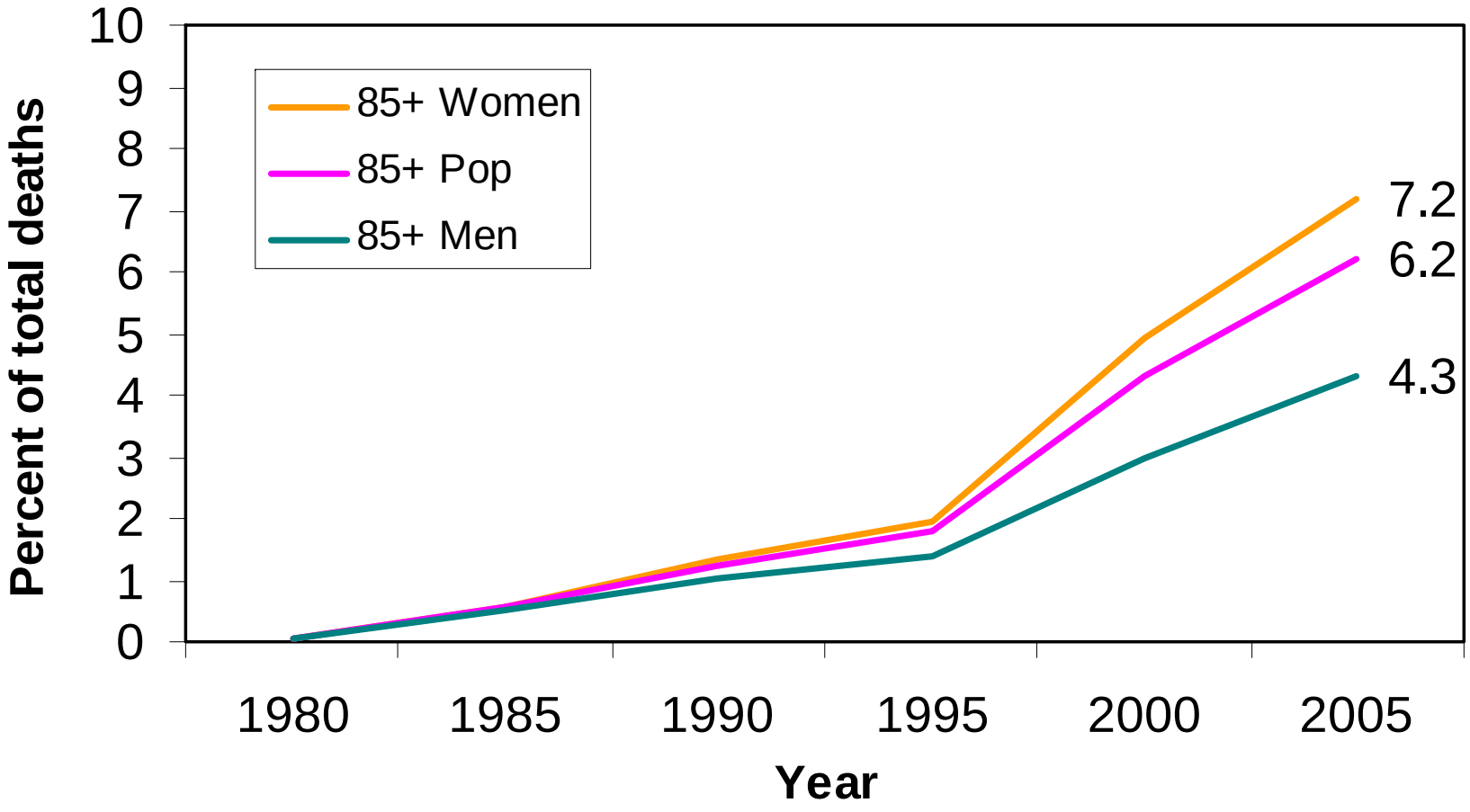
Proportion of Total Deaths due to Major Causes for the Population Aged 65 and Over, 1980-2005



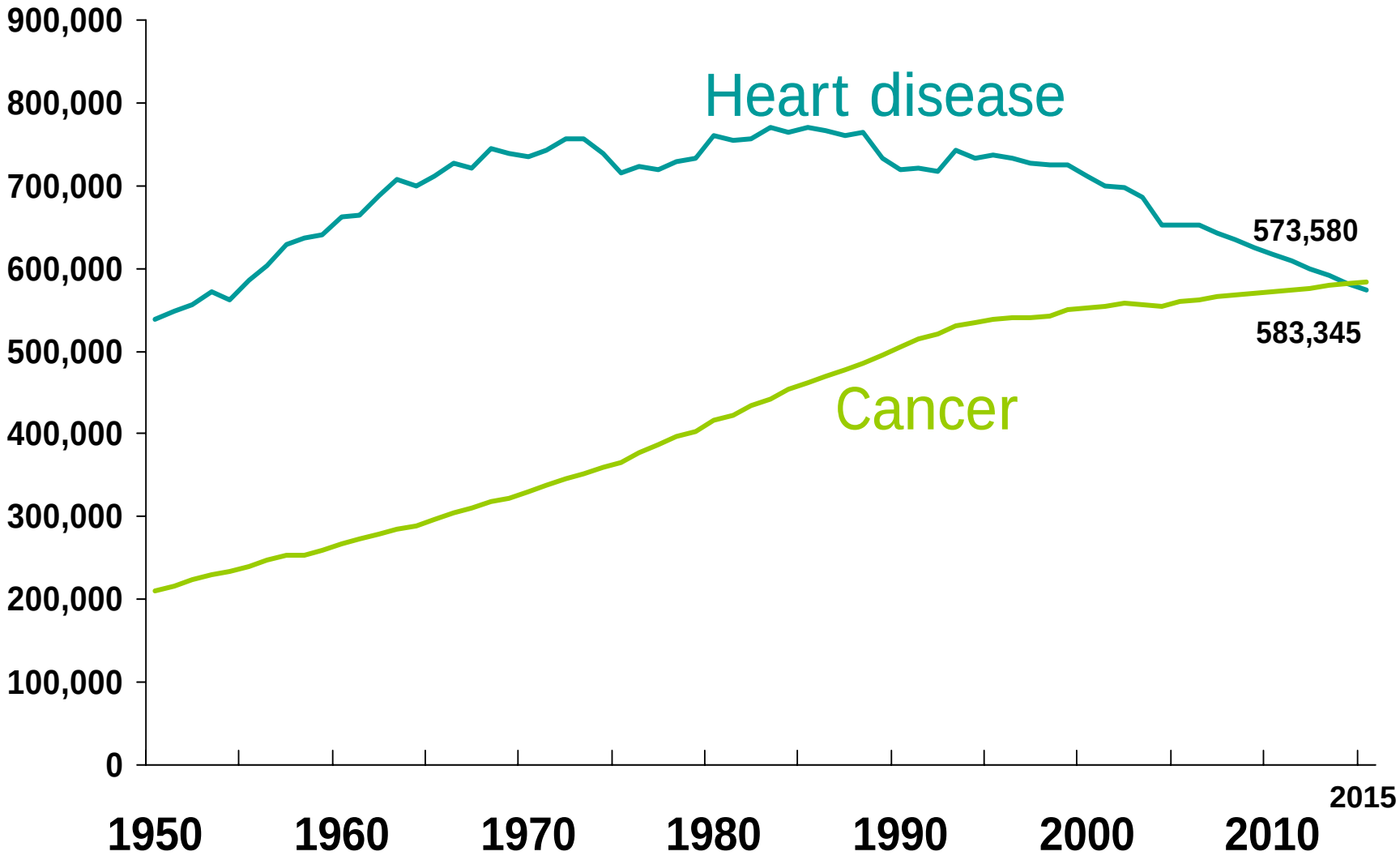
Proportion of Total Deaths due to Major Causes for the Population Aged 85 and Over, 1980-2005



Gender differences in the Proportion of Total Deaths due to Alzheimer's Disease in the Population Aged 85 Years and Over, 1980-2005



Number of Deaths Due to Heart Disease and Cancer (projected to 2015)



III. Summary and Conclusions

- **The US population has changed from a "young" population at the turn of the 20th century to an "old" population at the turn of the 21st.**
- **It is projected to age even more rapidly in the coming decades and become a "very old" population by 2050.**
- **The mortality regime has evolved to reflect this aging process**
  - more people are surviving to older ages
  - death is concentrated in a relatively small age range very near the end of the life span.
- **Causes of death also reflect the aging of the population. We've traversed the epidemiologic transition and are entering new terrain**
  - The relative burden of major chronic diseases is changing:
    - heart disease may be replaced by cancer as a leading cause of death
    - the relative burden of Alzheimer's disease appears to be on the rise

III. Summary and Conclusions

- **What are the implications for future health care and health status of these changes?**
  - **Growing aged population with rising proportions of deaths due to cancer and Alzheimer's disease suggestive of need to allocate more resources towards:**
    - **health prevention and education, where applicable**
    - **more research for innovative treatments**
    - **training more medical personnel, especially given the growing shortage of nurses and doctors in some specialties (with growing geographic disparities in access to health care)**
      - **more hospice care facilities and related health-care personnel**
      - **more oncologists, surgeons, neurologists and related specialists (neuropsychiatry, cognitive therapists, etc.)**

Implications cont'd

- **Proportion of deaths due to heart disease is declining but still accounts for most of the deaths at older ages.**
  - **As more people enter those older age groups, there will be greater need for**
    - **related health-care personnel**
    - **advances in the treatment of heart disease**
    - **closing of the gap in treatment by gender and race/ethnic group.**

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