Mortality
Education and Income

Social Security Advisory Board's Technical Panel meeting

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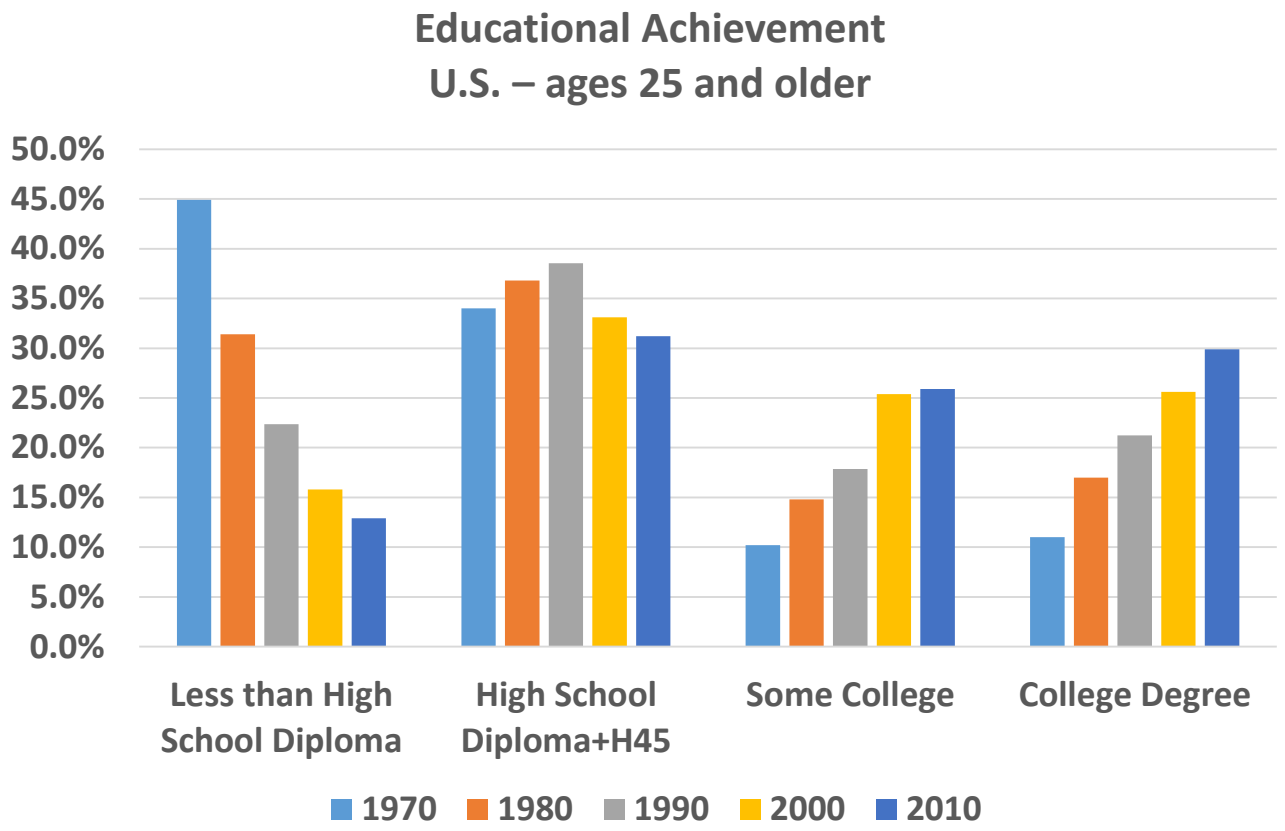
Topics covered

1. Education and income
2. And mortality
3. Projections

Education

- Educational achievement of U.S. adult population has shifted dramatically



Education by Age

2010				
Age	High School		College	
	< Diploma	Graduate	Some	Degree
25-34	11.6%	27.2%	28.4%	33.9%
35-44	11.7%	28.6%	26.6%	33.1%
45-54	10.4%	32.8%	27.3%	29.4%
55-64	10.4%	31.3%	26.5%	31.7%
65-74	17.0%	35.4%	22.3%	25.2%
75+	24.6%	37.6%	18.6%	19.2%

2000				
Age	High School		College	
	< Diploma	Graduate	Some	Degree
25-34	11.8%	30.6%	28.3%	29.3%
35-44	11.4%	33.7%	27.9%	27.0%
45-54	11.1%	31.0%	27.7%	30.2%
55-64	18.3%	35.7%	22.5%	23.5%
65-74	26.4%	37.4%	18.7%	17.5%
75+	35.4%	34.1%	17.1%	13.4%

1990				
Age	High School		College	
	< Diploma	Graduate	Some	Degree
25-34	14.2%	41.3%	21.0%	23.6%
35-44	12.4%	39.3%	22.1%	26.3%
45-54	16.1%	38.7%	19.7%	25.6%
55-64	24.9%	40.5%	15.2%	19.5%
65-74	33.7%	38.9%	12.7%	14.7%
75+	48.1%	30.7%	10.5%	10.8%

1980				
Age	High School		College	
	< Diploma	Graduate	Some	Degree
25-34	14.4%	39.7%	21.6%	24.2%
35-44	21.9%	41.3%	16.2%	20.7%
45-54	31.7%	40.2%	12.4%	15.6%
55+	50.1%	30.3%	9.8%	9.9%

1970				
Age	High School		College	
	< Diploma	Graduate	Some	Degree
25-34	26.2%	44.0%	14.1%	15.8%
35-44	35.7%	40.5%	11.0%	12.8%
45-54	41.7%	38.1%	10.1%	10.0%
55+	64.2%	21.0%	7.3%	7.5%

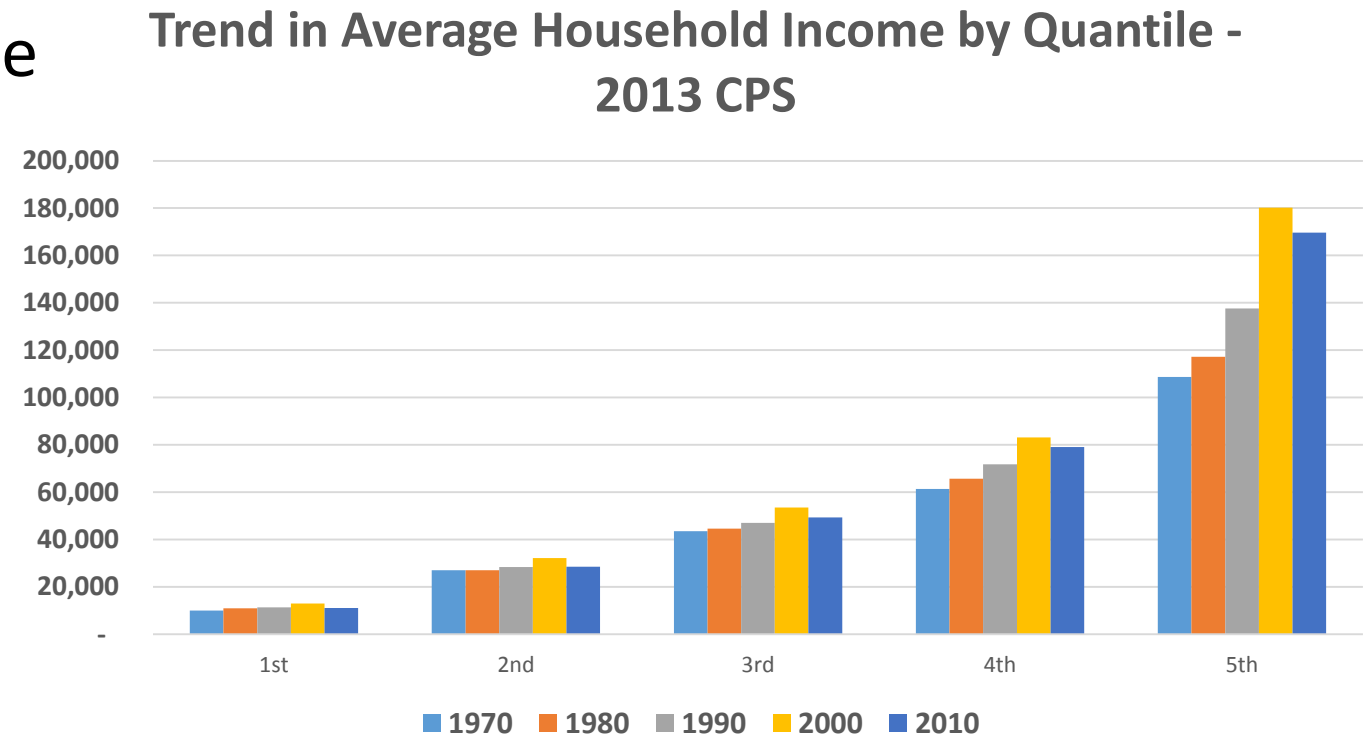
- As seen from the distribution between the 4 education categories by age, the U.S. will reach a steady state education level through age 74 in about 10 years and through age 84 in about 20 years
- Thus, although mortality has benefited from greater quantities of education levels for the last 50 years, this mortality boost will be reduced or eliminated in the ultimate period (in 25-75 years)

Income distribution

- Gini Index – growing income inequality, especially in the 1980s and 1990s
  - Although a great deal relates to income greater than Social Security taxable cap

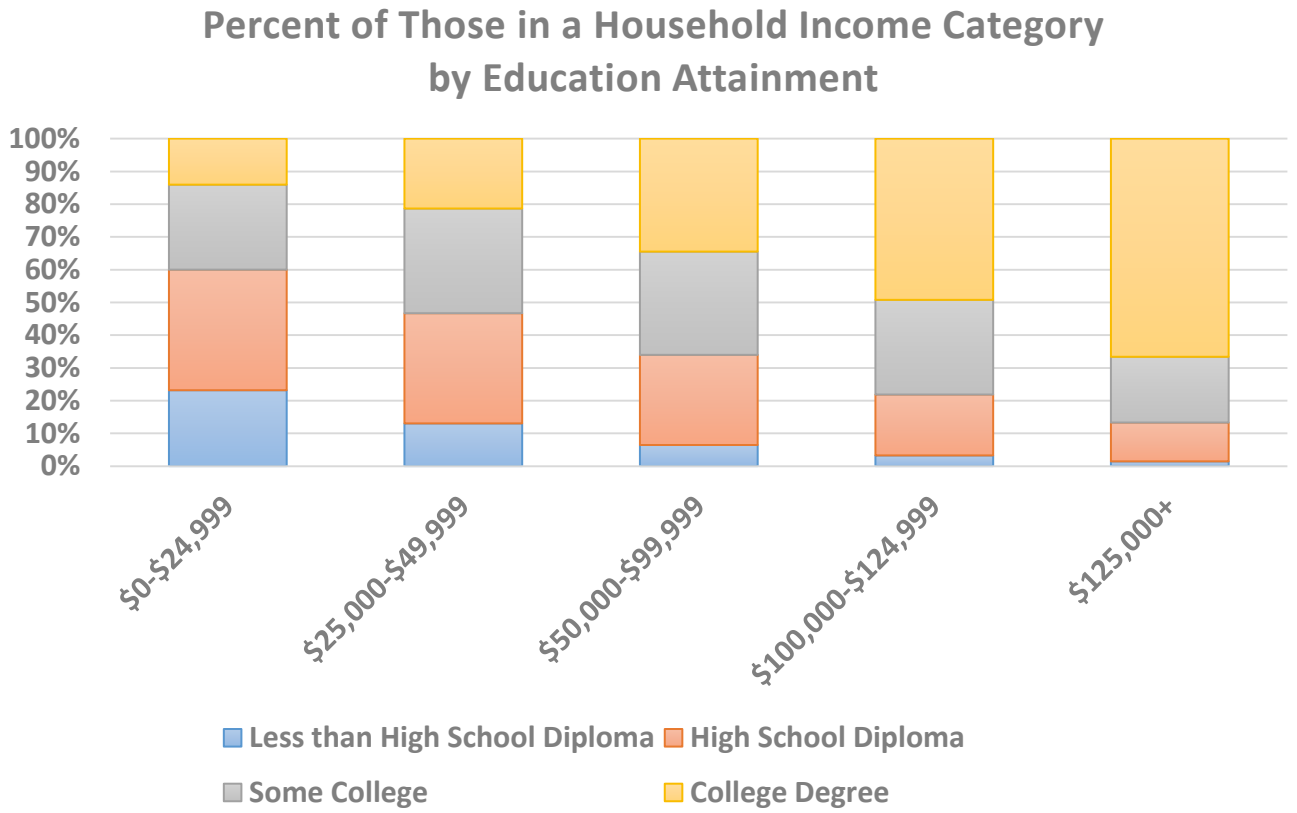
Year	1970	1980	1990	2000	2010
Index	.394	.403	.428	.462	.469

- Income



Relation between Education and Income

- Obviously a high correlation between education and income



Mortality

- Numerous studies have found that levels of education and higher income (wages) are negatively correlated with mortality
  - Both in longitudinal and pension/life insurance studies
- Several studies have indicated mortality differentials have increased since the 1970s
  - Some, but not all studies have found that differentials by education/behavior decrease at advanced ages
- There are two ways in which factors such as education and income may affect future mortality
  - Relativities among current population categories – affects the base rates and total population
    - As long as the population mix stays the same, the future should maintain current mortality relativities
  - Changes in the mix of the population or mortality in one or more categories move at different paces
    - Affects the aggregate mortality improvement factors over time
    - Affects the revenue and benefit projections as both the amount of revenue and benefits change

Education, income and mortality

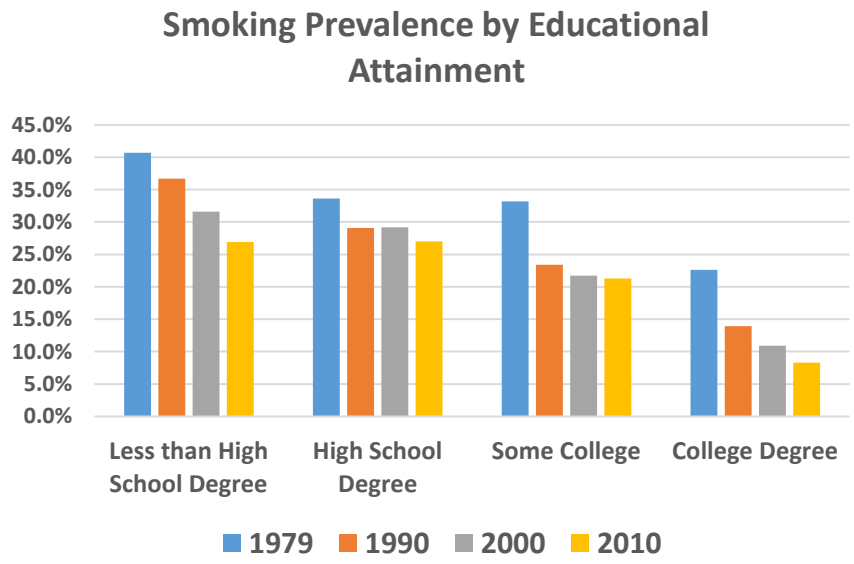
- Reasons for relationship between education and mortality
  - Access to health care
  - Adherence to treatment regimes
  - Environment/family/geographic; childhood
  - Knowledge of risk factors
  - Behavior, e.g., smoking, obesity
  - Likelihood to self-report medical history
  - Cutler/Lleras-Muney (2010) – 30% income, health insurance, family background; 30% knowledge and cognitive ability; 10% social networks
- Additional reasons for relationship between income and mortality
  - Occupation
  - Insurance protection
  - Unemployment/stress level

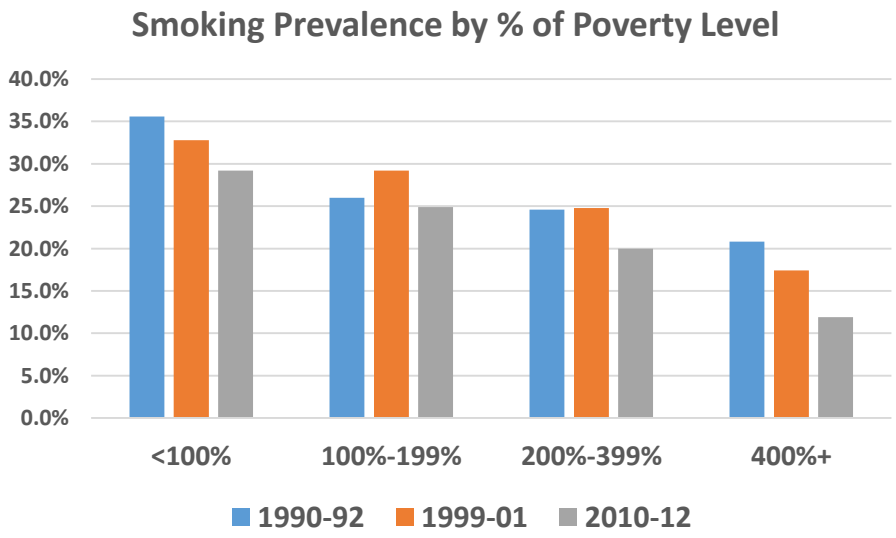
Education, income and mortality

- Causal relationships not necessarily definitive or direct
  - For example, poor health can contribute to amount and quality of education and income
- Level of education appears to affect mortality of males more than females
- Education data generally of higher quality and constant for adult life, although not as directly related to Social Security benefits
- Factors that contribute to effects of education
  - A Scandinavian study indicated that 23% of the effect of education for females is due to health behaviors, compared with 45% for males
  - Danish twin study – although association, no causal relationship, as all due to parental family and individual specific factors
- Increasing gap between those with different levels of education
  - But, looking at slide 5, the category of females with less than a high school diploma whose mortality has increased has shrunk and thus has more disadvantaged

Other factors

- The growing mortality gap between educational attainment levels appears greater for males
  - Part of the gap appears to be explained by behavior such as smoking, although its effect may be less than 50% (and less for females)
    - In one study, incidence of lung cancer and COPD was twice as high between educational levels
  - However, the percentage reduction in smoking prevalence has been faster for those with a college degree; due to the lag between smoking and premature death, this differential may widen before contracting





Possible modeling approaches

- Separate projections by population segment
  - But reliable data is not sufficiently available
- Projections consistent with current demographic mix
  - Effect on average benefit size – post-entitlement factor (next slide)
    - Directly incorporate experience of factors including aggregate of factors including income and education
- Projections consistent with expected future mix and changes
  - Consider the effect of these expectations in deriving mortality improvement projections, e.g., wearing off effect of reducing educational effects and reduction in smoking prevalence

- OACT uses the 2nd and 3rd method

Post-entitlement factors

- Annually applied to average benefit size after year of entitlement
- Primary contributing factors:
  - Differential mortality by benefit size
  - Post-entitlement earnings that increase benefit size
- Similar, but smaller factors applied to retirees converted from DI and DI beneficiaries

Gender	Period	1	2	3	4	5	6	7	8	9	10	11	12+	Cum to 12
Females	2002-03 to 2006-7	0.97%	0.69%	0.74%	0.63%	0.48%	0.40%	0.26%	0.24%	0.24%	0.22%	0.18%	-0.08%	5.10%
	2006-7 to 2011-2	0.97%	0.70%	0.65%	0.59%	0.51%	0.35%	0.35%	0.28%	0.30%	0.23%	0.15%	0.22%	5.42%
Males	2002-03 to 2006-7	0.79%	0.67%	0.59%	0.52%	0.43%	0.41%	0.40%	0.34%	0.34%	0.27%	0.30%	0.18%	5.35%
	2006-7 to 2011-2	0.79%	0.70%	0.61%	0.52%	0.56%	0.36%	0.34%	0.40%	0.39%	0.34%	0.35%	0.28%	5.80%

- No significant trend in the past decade; recommend regular review in the future

Sources

Demographic data: U.S. Census (Statistical Abstracts)

Smoking data: National Health Interview Surveys

Post-entitlement data: OCACT, 1% Continuous Work History sample