Why We Did This Study

- Previous research has shown higher income levels are associated with lower mortality rates.

- Higher lifetime earnings are also likely to be associated with lower mortality rates. This relationship is important for analyzing and projecting the costs for the Social Security program.

- This study illustrates the spread in mortality rates by lifetime career-average earnings levels. Previous studies have generally been done based on partial career earnings levels that are not reflective of earnings that determine Social Security benefit levels.

Mortality By Career-Average Earnings Level

- This study provides another measure of, and perspective on, the extent of variation in mortality rates by lifetime career-average earnings levels and how they have changed over time.

- Average indexed monthly earnings (AIME) is a useful measure of a person's lifetime earnings.

- We analyzed the relationship between AIME levels and mortality rates for Social Security retired-worker beneficiaries.

Mortality By Career-Average Earnings Level Study

- Compared the death rates among retired-worker beneficiaries by sex, age group, and lifetime career-average earnings level (AIME) to the annual death rate among retired-worker beneficiaries for that sex and age group.

- For each sex and age group, we calculated the relative mortality ratios at various AIME levels.

Data and Methods

Data

- Data Source: Social Security Administration's June 2017 Master Beneficiary Record (MBR) file.

- Excluded:
  - Windfall Elimination Provision
  - Totalization agreements
  - AMW PIA benefit calculation
  - Previously entitled for a Social Security disability benefit

Average Indexed Monthly Earnings Calculation

- At age 62, index earnings to reflect the change in general wage levels that occurred during the worker's years of employment.

- Up to 35 years of earnings are needed to compute the average indexed monthly earnings.

- AIME = Average of the highest 35 years of indexed earnings / 12

AIME Quintiles

Male AIME Quintiles

Male Quintiles	AIME Range[a]	Percentage of Beneficiaries
Lowest AIME Quintile	AIME ≤ $1,866	20%
2nd AIME Quintile	$1,866 < AIME ≤ $3,230	20%
3rd AIME Quintile	$3,230 < AIME ≤ $4,448	20%
4th AIME Quintile	$4,448 < AIME ≤ $5,863	20%
Highest AIME Quintile	$5,863 < AIME	20%

[a] The AIME ranges in this example are for male retired-worker beneficiaries who were age 65 in 2015.

Female AIME Quintiles

Female Quintiles	AIME Range[a]	Percentage of Beneficiaries
Lowest AIME Quintile	AIME ≤ $908	20%
2nd AIME Quintile	$908 < AIME ≤ $1,640	20%
3rd AIME Quintile	$1,640 < AIME ≤ $2,520	20%
4th AIME Quintile	$2,520 < AIME ≤ $3,761	20%
Highest AIME Quintile	$3,761 < AIME	20%

[a] The AIME ranges in this example are for female retired-worker beneficiaries who were age 65 in 2015.

Calculations

- For each record, we determined:
    - Sex and age
    - AIME level
    - Exposure: Active, Death, Termination Other Than Death
    - Deaths
- Group data by sex, age group, and AIME level, and calculated annual death rates by dividing the number of death by the years of exposure.
- Relative Mortality Ratio – divide the death rates for each AIME level by the death rate for everyone in the sex and age group at all AIME levels.

Results by AIME Quintile

Results

- We observed lower death rates for retired-worker beneficiaries with higher-than-average AIME levels, and higher death rates for retired-worker beneficiaries with lower-than-average AIME levels.

- At older ages, the differences in death rates across AIME levels diminish.

- Trends from 1995-2015 show the spread in death rates among the AIME levels remaining fairly steady.
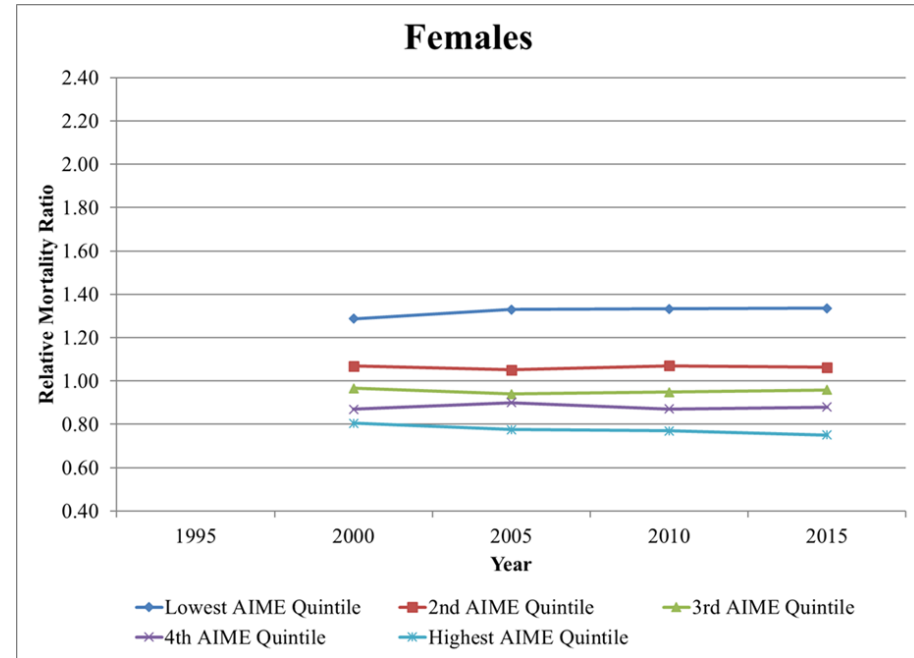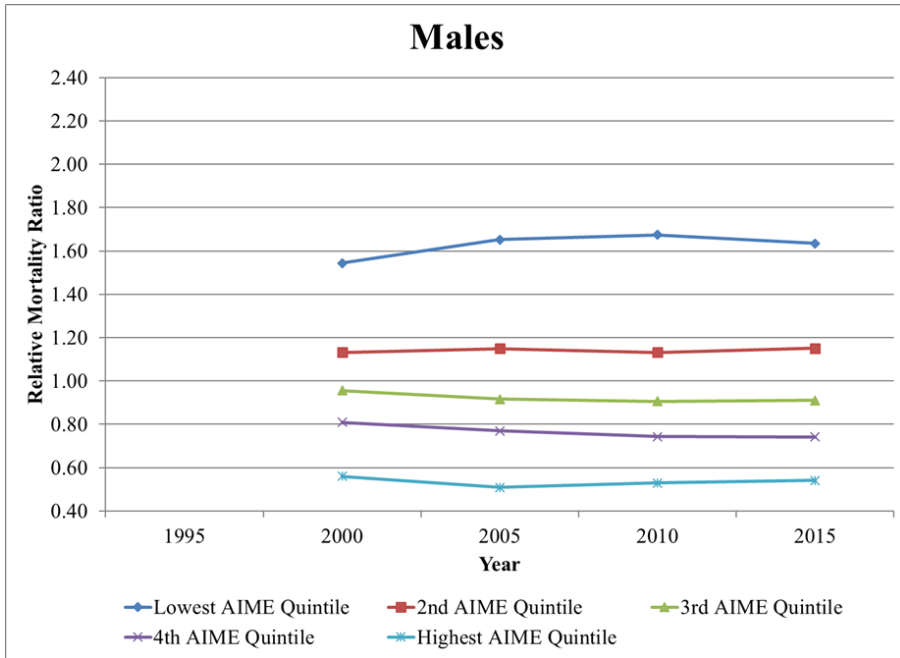
Age Group 65-69 Relative Mortality Ratios
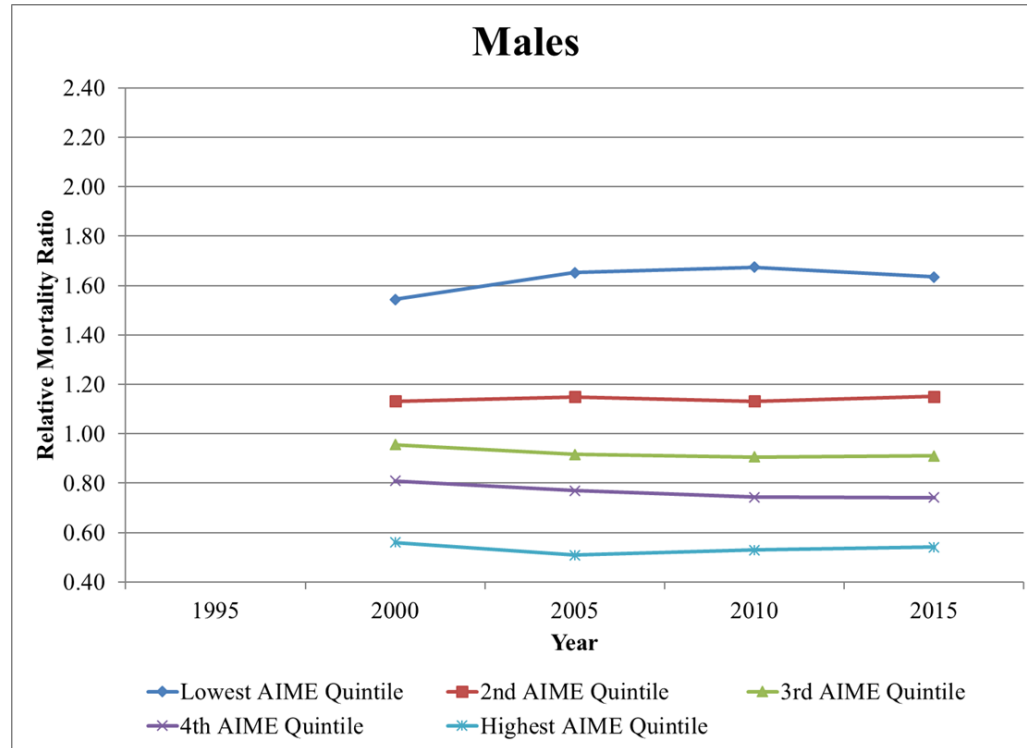
Male / Female Comparison

- Females generally follow the same relative mortality pattern as males, in the higher earners have lower mortality.

- Spreads in the female relative mortality ratios among AIME quintiles are smaller than those for males.

- Questions: Is the socioeconomic status gradient smaller for women? Or are earnings a less accurate measure of socioeconomic status for women?

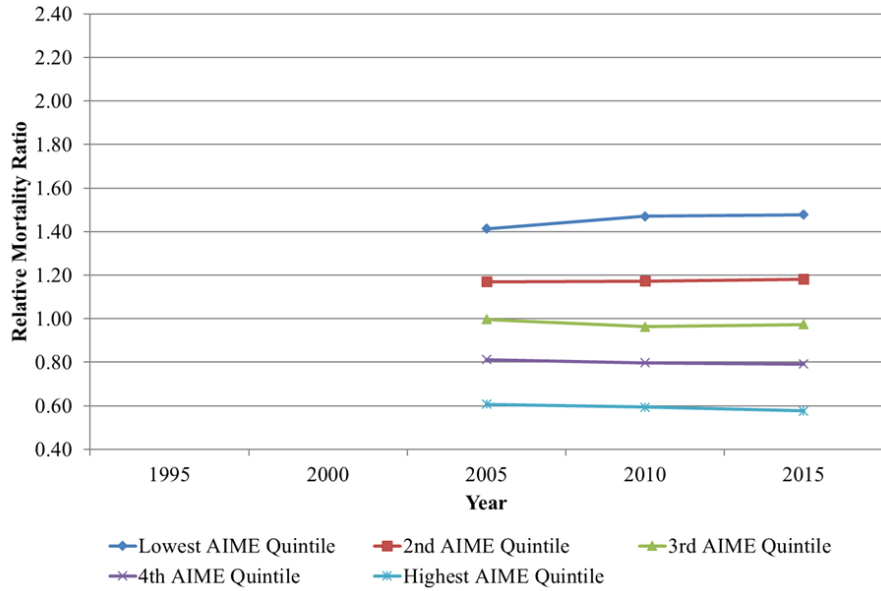# Age Group 65-69 Relative Mortality Ratios

Age Groups

- Spread in relative mortality ratios among the quintiles decreases at older ages.

2015 Relative Mortality Ratios by Age Group for Retired-Worker Beneficiaries

	62-64	65-69	Age 70-74	75-79	80-84	62-84 Total
Male Retired-Worker Beneficiaries by AIME Level:						
Lowest AIME Quintile	1.77	1.63	1.48	1.33	1.18	1.38
Highest AIME Quintile	0.52	0.54	0.58	0.65	0.75	0.65
Female Retired-Worker Beneficiaries by AIME Level:						
Lowest AIME Quintile	1.54	1.34	1.22	1.13	1.06	1.16
Highest AIME Quintile	0.73	0.75	0.78	0.84	0.91	0.84

Age Groups 70-74 and 75-79 Relative Mortality Ratios
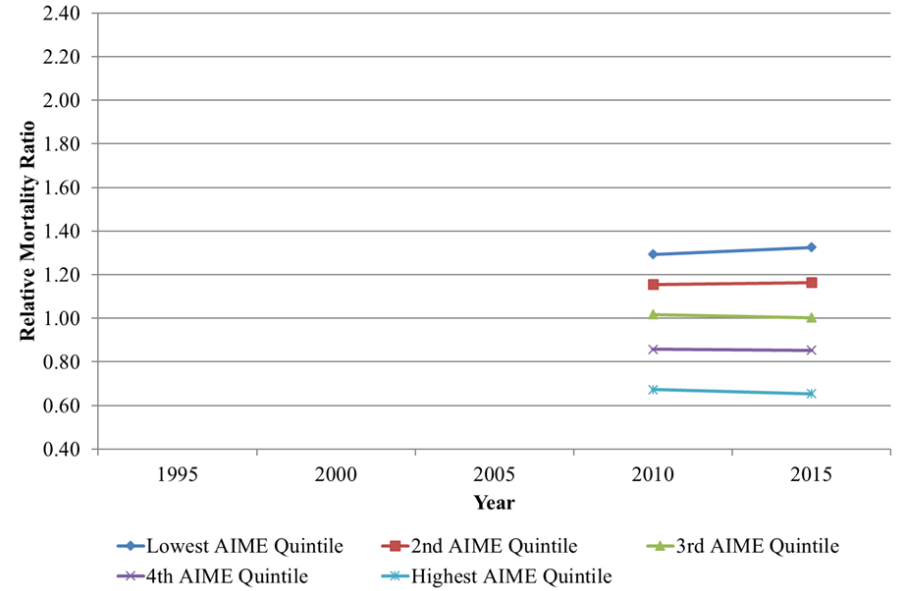
Age Group 62-64 Relative Mortality Ratios
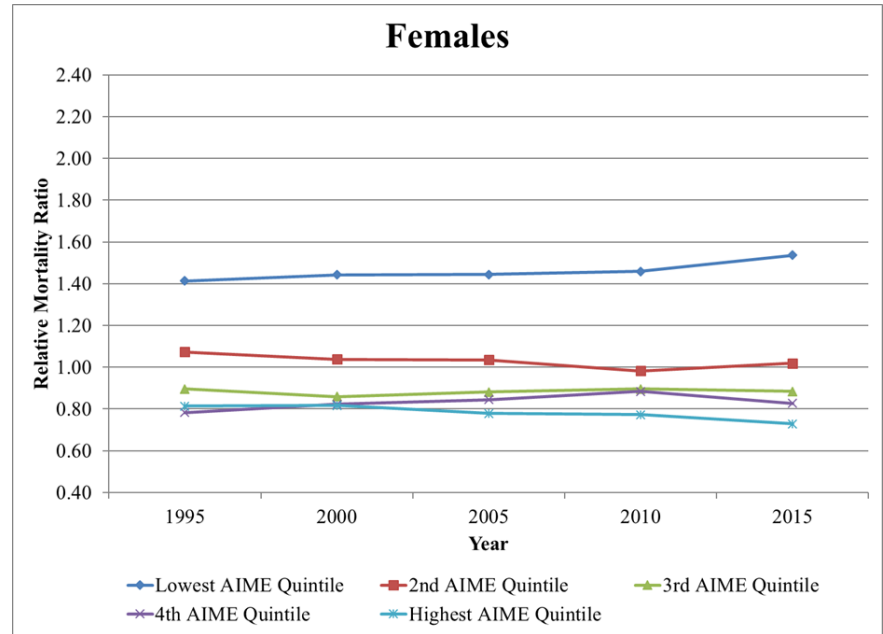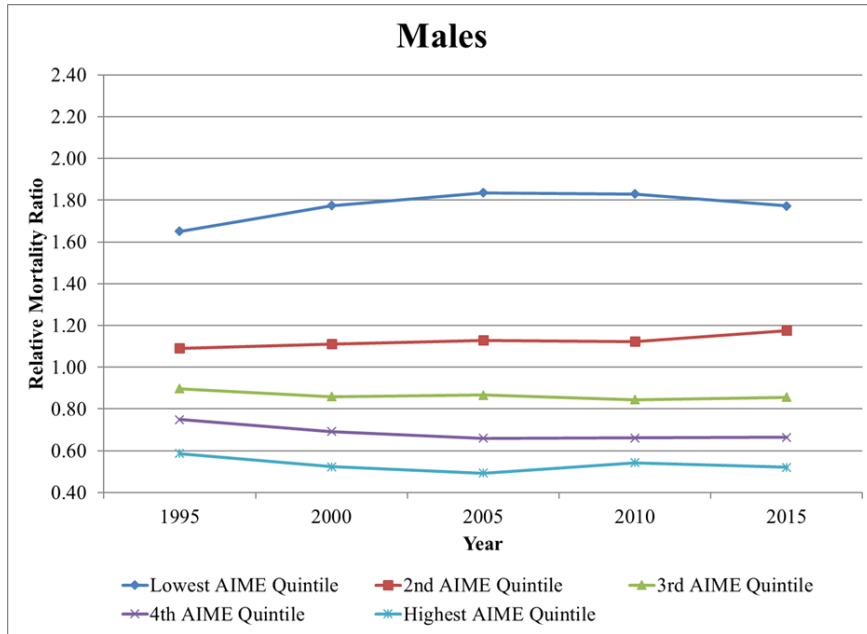
Conclusion

- Higher AIME levels correlate with lower mortality rates, while lower AIME levels correlate with higher mortality rates.

- The trends from 1995 to 2015 show that the spread in relative mortality ratios among the AIME quintiles remain fairly steady.   The spreads widens, but not significantly, and even slightly compresses for some age groups in recent years.

Next Steps

What We Do Now in Current Projections

- Currently, the calculations in the annual Social Security Trustees Reports do include the effects of lower mortality for beneficiaries with higher AIME and higher mortality for beneficiaries with lower AIME. These effects are incorporated into our projections by the use of "post-entitlement factors".

- Post-entitlement factors are designed to capture changes in average benefit levels after workers start receiving benefits, beyond annual cost-of-living adjustment (COLAs). Average benefits tend to rise over time due to:
  - Additional earnings and benefit recomputations
  - Differential mortality (those with higher benefits tend to live longer)

How We Can Use These Results

- In this study, we also completed a hypothetical worker interval analysis because of its potential use for incorporating mortality differences into the Office of the Chief Actuary's recurring Actuarial Notes on internal real rates of return (note 2018.5) and money's worth ratios (note 2018.7).

- We are also evaluating ways to more directly incorporate the results of this study into our projections of actuarial status.

Possible Areas of Future Study

- The female 2015 group of 62-64 year olds have a larger spread in death rates than prior birth cohorts, which coincides with increased female labor force participation. Will this trend continue for females? Will females converge to males? Is there a possible cohort effect for women? Is there a change in the characteristics of women taking early retirement?

- Many workers with low AIMEs due to years of zero earnings are likely foreign-born individuals, and we speculate that foreign-born immigrants may be healthier than average. One possible area that could be further explored is to determine the percentage of foreign-born individuals in the Lowest AIME Quintile and examine their relative mortality ratio.

Mortality by Career-Average Earnings Level

- Link to the Mortality by Career-Average Earnings Level Study - https://www.ssa.gov/OACT/NOTES/pdf_studies/study124.pdf

- Links to similar research (including literature survey by Hilary Waldron) – https://www.ssa.gov/policy/docs/ssb/v67n3/v67n3p1.html
https://www.ssa.gov/policy/docs/ssb/v73n1/v73n1p1.html

- Links to our recurring Actuarial Notes – https://www.ssa.gov/OACT/NOTES/actnote.html