SOCIETY OF ACTUARIES

Mortality and Longevity

Mortality by Socioeconomic Category in the United States: Data Summary

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Introduction

In November 2020, the Society of Actuaries' Mortality and Longevity Strategic Research Program Steering Committee released the research report, Mortality by Socioeconomic Category in the United States[1]. Authored by Dr. Magali Barbieri of the University of California, Berkeley, the research examines socioeconomic differences in historical U.S. population mortality trends.

Using eleven county-wide variables on education, occupation, employment, income and housing price and quality, the study stratifies the U.S. population into socioeconomic categories of equal population size. The outcome of the study is a set of detailed life tables by socioeconomic category and year which can be used for mortality models including refining assumptions for specific insured cohorts. Details on the data and methodologies used in the development of the life tables are summarized in the research report.

The report, life tables by socioeconomic quintiles and deciles, and county-level socioeconomic data can be found on the SOA website[2]. The available data spans the period 1982-2018. Additionally, a menu of interactive visualization tools provides a window into the underlying data. This paper highlights some of the observed trends across the 37-year period covered by the data.

U.S. County-Level Socioeconomic Categories

Separately for each year of data, a Socioeconomic Index Score (SIS) was computed for each county. Marin County, California in the north San Francisco Bay area, and Loudon and Arlington counties in Virginia, in the greater Washington D. C. region, held the top SIS during the study period. Starr County in the Texas Rio Grande Valley had the lowest SIS for much of the study period.

The Socioeconomic Index Scores, in turn, were used to group counties into quintiles and deciles, with each quintile and decile holding 20% and 10% of the total U.S. population, respectively. Besides the Socioeconomic Index scores, the county-level socioeconomic data file contains the values of the socioeconomic variables used in the scoring process, the county population, and assigned quintile and decile.

Figure 1 shows the progression of the quintiles over the study period for the 3000+ counties in the contiguous U.S. The 1980 Census data was used for the start of the period and the 2014-2018 American Community Survey (ACS) data was the basis for the quintile categorization for the end of the study period. For the figures and tables in this paper, Quintile 1 is the lowest socioeconomic quintile and contains the largest geographical area representing 1,422 counties using the 2014-2018 ACS data, while Quintile 5 is the highest socioeconomic quintile but is composed of only 155 counties (Table 1).

Table 1

NUMBER OF COUNTIES IN EACH QUINTILE FOR CONTIGUOUS U.S.

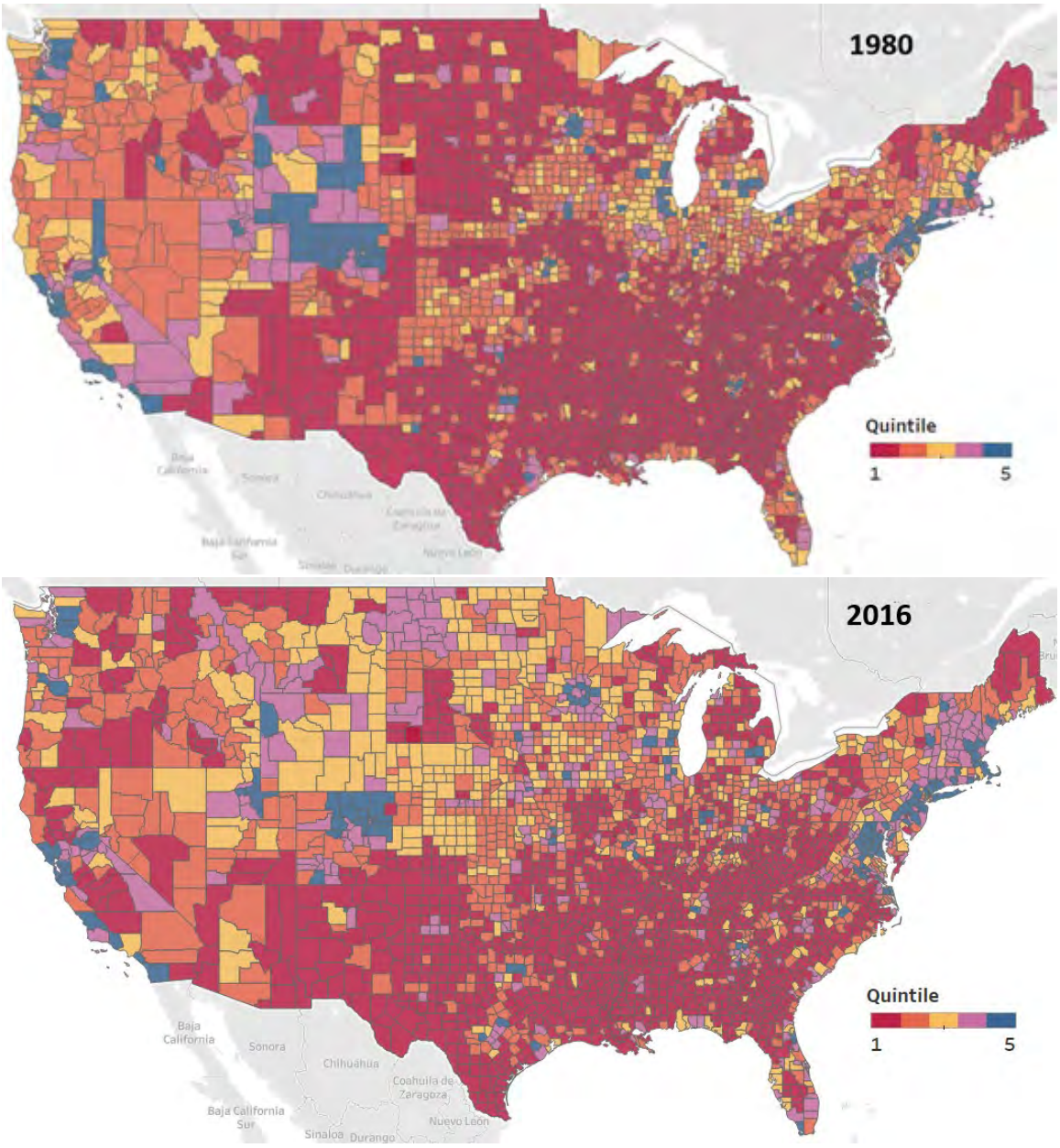
	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Start of the period	1730	750	312	170	148
End of the period	1422	746	432	344	155

At the start of the study period, Quintile 1 covers much of the South and the upper Midwest region. Quintile 2 includes a large geographic area of the West and geographically smaller counties throughout the rest of the country. Quintiles 3-5 are not restricted to any one area but are generally the more populated counties within the U.S.

During the study period, economic development expands into the South with an increasing number of counties in higher quintile categories compared to the start of the period. This shift can be seen in such states as VA, NC, SC, TN, GA, and FL. This may also be a reason for the decreasing quintile categories in WI, MI, IL, IN, and OH counties as their residents seek job opportunities in these warmer climate locales. The quintile categories in the Northeast and the Dakotas are also on the rise.

Figure 1

U.S. MAP OF THE SOCIOECONOMIC QUINTILES



Annual Mortality Rates and Improvement Rates, by Socioeconomic Category

Visualization tools for both the quintile and decile mortality data are available on the SOA's website. As illustrated in Figures 2 and 3, mortality disparities exist as the data reveals a strong positive correlation between socioeconomic status[3] and the average geometric rate of mortality improvement[4].

Figure 2

GEOMETRIC AVERAGE ANNUAL RATE OF MORTALITY IMPROVEMENT FROM 1982 TO 2018: FEMALES

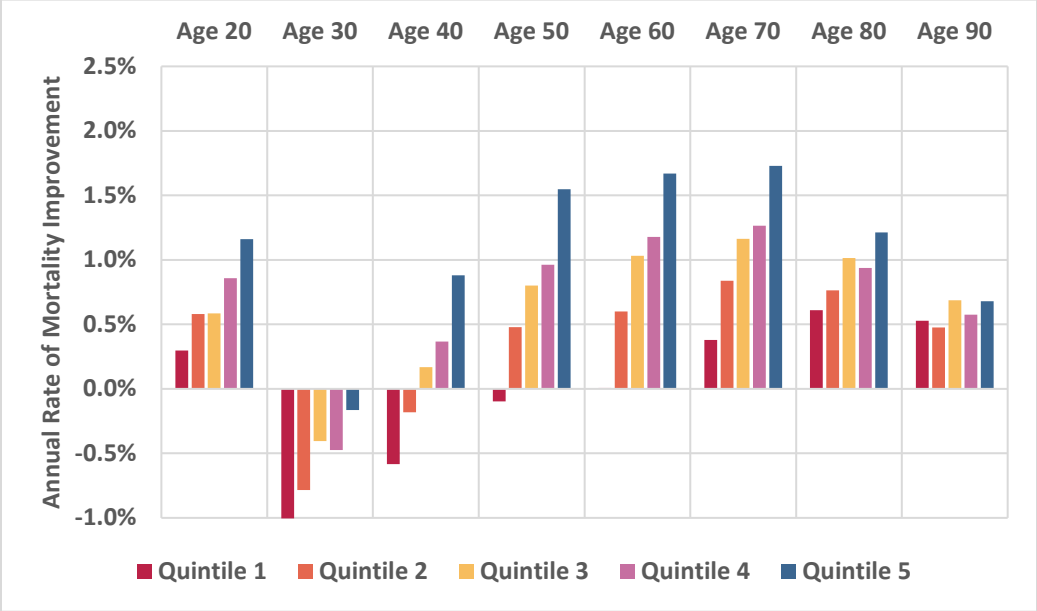
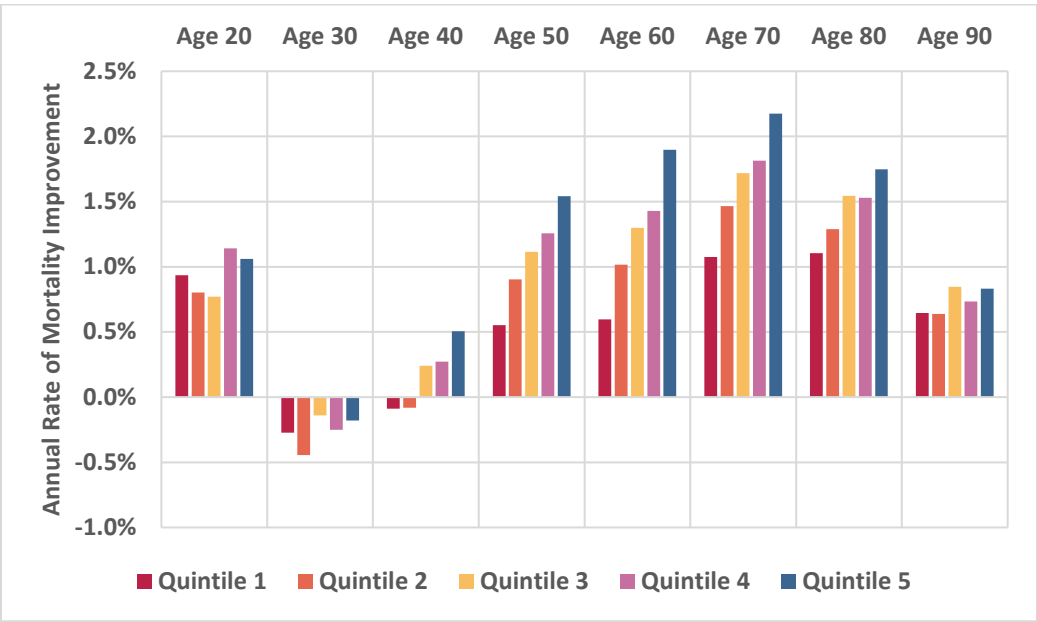


Figure 3

GEOMETRIC AVERAGE ANNUAL RATE OF MORTALITY IMPROVEMENT FROM 1982 TO 2018: MALES



Particularly between the ages of 50 and 80, the period from 1982 through 2018 can be characterized as one of increasing mortality inequality as a function of socioeconomic status. As illustrated in Figures 4 and

5 which focus on age 70, in 1982 there was little difference in mortality rates across the five quintiles, but by 2018 a large differential had emerged.

Figure 4
ANNUAL MORTALITY RATES FOR 70-YEAR-OLD FEMALES, BY YEAR AND SOCIOECONOMIC QUINTILE

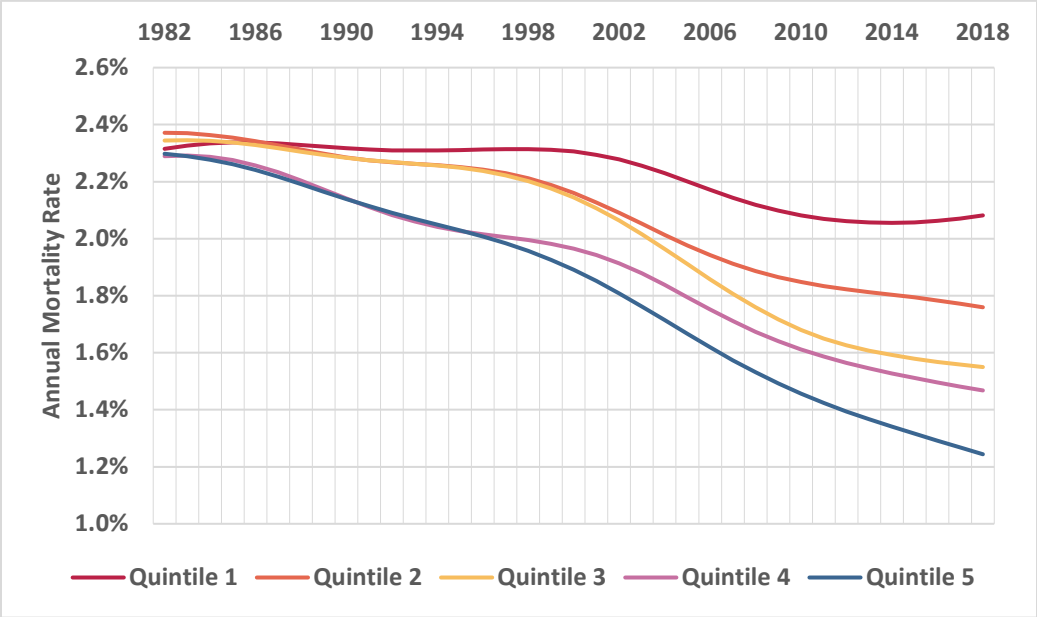
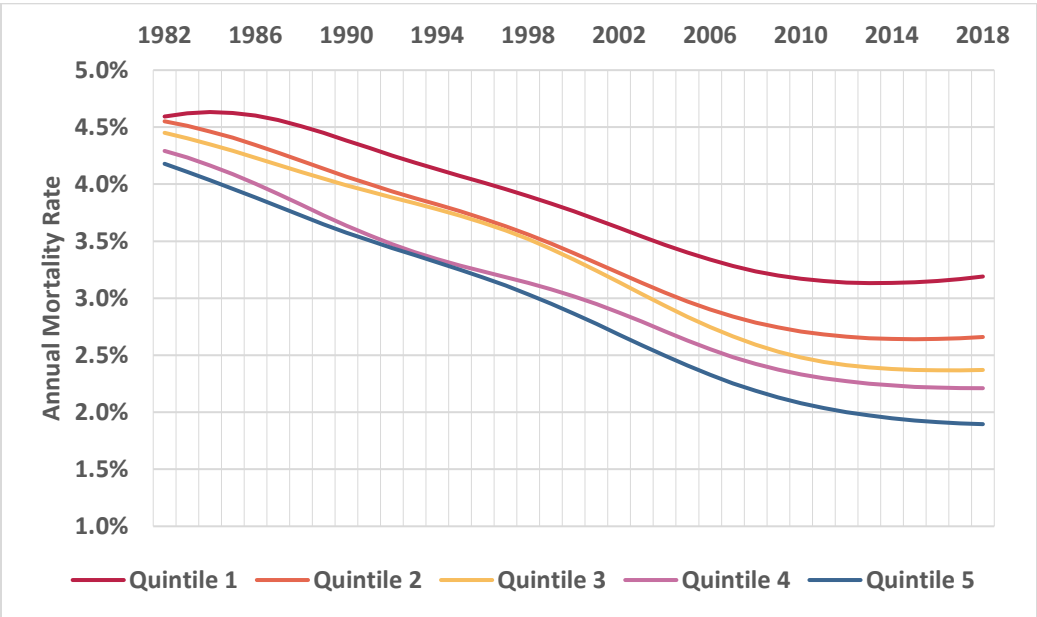


Figure 5
ANNUAL MORTALITY RATES FOR 70-YEAR-OLD MALES, BY YEAR AND SOCIOECONOMIC QUINTILE



Conclusion and Future Research

Historical U.S. trends show a widening mortality gap between socioeconomic categories, especially between the lowest and highest socioeconomic deciles and quintiles. To stay abreast of this evolving trend, the socioeconomic category life tables are expected to be updated annually as new restricted county-level mortality data from the National Center for Health Statistics become available.

Further, identifying and understanding the drivers for the mortality disparities is important to closing the divide. For 2021, this is an emphasis of the SOA's Mortality and Longevity Strategic Research Program Steering Committee initiating new research to examine cause of death mortality by socioeconomic category.

[1] Barbieri, Magali. *Mortality by Socioeconomic Category in the United States.* Society of Actuaries, November 2020.

[2] https://www.soa.org/resources/research-reports/2020/us-mort-rate-socioeconomic/

[3] In all figures in this report, quintile 1 is the lowest socioeconomic quintile, while quintile 5 is the highest.

[4] Using smoothed q_x data, the rates in Figures 2 and 3 were computed as follows: $1 - [q_x(2018) / q_x(1982)] \wedge (1 / (2018 - 1982))$.

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With roots dating back to 1889, the Society of Actuaries (SOA) is the world's largest actuarial professional organization with more than 31,000 members. Through research and education, the SOA's mission is to advance actuarial knowledge and to enhance the ability of actuaries to provide expert advice and relevant solutions for financial, business and societal challenges. The SOA's vision is for actuaries to be the leading professionals in the measurement and management of risk.

The SOA supports actuaries and advances knowledge through research and education. As part of its work, the SOA seeks to inform public policy development and public understanding through research. The SOA aspires to be a trusted source of objective, data-driven research and analysis with an actuarial perspective for its members, industry, policymakers and the public. This distinct perspective comes from the SOA as an association of actuaries, who have a rigorous formal education and direct experience as practitioners as they perform applied research. The SOA also welcomes the opportunity to partner with other organizations in our work where appropriate.

The SOA has a history of working with public policymakers and regulators in developing historical experience studies and projection techniques as well as individual reports on health care, retirement and other topics. The SOA's research is intended to aid the work of policymakers and regulators and follow certain core principles:

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