2026 LIFE INSURANCE AND ANNUITY CONFERENCE

The Power of Promise

Understanding Today's Mortality Drivers: Insights from SOA Practice Research

LIMRA LOMA Navigate With Confidence

Society of Actuaries®

ACLI Financial Security for Life

Kara Clark

Senior Research Actuary

Society of Actuaries

Donna Megregian

Vice President & Actuary

RGA

Joe Wurzburger, *Moderator*

Managing Director, Strategic Partnerships & Government Affairs

Society of Actuaries

LIMRA LOMA Navigate With Confidence

Society of Actuaries

ACLI Financial Security for Life

RGA

Three recent SOA research reports provide context on recent mortality drivers.

U.S. Population Mortality Observations – Updated with 2022 Experience

U.S. Drug Overdose Crisis: Past, Present, and Future

Quantifying the Effects of Mental Health on U.S. Suicide and Mortality Rates

LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life

The population report measures mortality using national data.

- Uses national death certificate data.
- Applies consistent ICD-10 cause coding.
- Compares patterns across years and ages.

Source: U.S. Population Mortality Observations – Updated with 2022 Experience

LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life

Mortality deteriorated in 2020 and improved in 2022.

- The pandemic caused a large mortality shock.
- Some improvement returned by 2022.
- Cumulative deterioration remains meaningful.

Table 1

U.S. POPULATION MORTALITY IMPROVEMENT BY SELECTED PERIODS

All Ages	Average Annual Improvement		Cumulative Improvement	Average Annual Improvement			Cumulative Improvement	Average Annual Improvement		
			With COVID				Without COVID			
	1999-2009	2009-2019	2019-2022	2019-2020	2020-2021	2021-2022	2019-2022	2019-2020	2020-2021	2021-2022
All	1.5%	0.5%	-10.1%	-16.9%	-1.5%	7.1%	-4.0%	-4.9%	0.4%	0.5%
Male	1.8%	0.5%	-10.6%	-17.9%	-2.1%	8.0%	-4.1%	-5.1%	-0.1%	1.1%
Female	1.4%	0.5%	-9.2%	-15.5%	-0.7%	6.1%	-3.4%	-4.4%	1.0%	-0.1%

Source: U.S. Population Mortality Observations – Updated with 2022 Experience

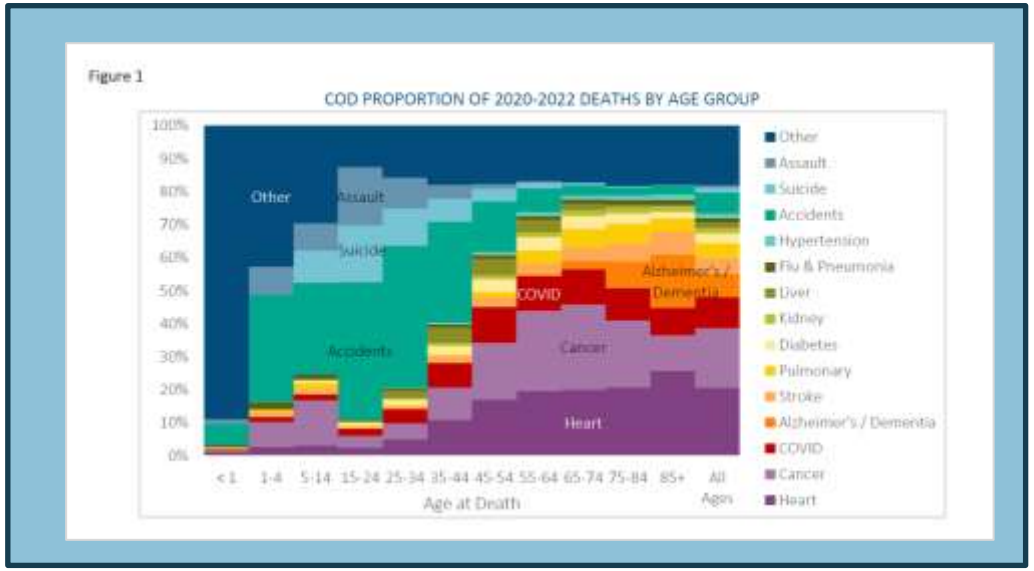
LIMRA LOMA Navigate With Confidence

Society of Actuaries

ACLI Financial Security for Life

Working-age deaths reflect a different cause mix.

- Heart disease remains structurally important.
- Cancer remains a leading cause.
- Accidents increased during the pandemic period.
- Suicide represents a meaningful share of deaths.



Source: U.S. Population Mortality Observations – Updated with 2022 Experience

LIMRA LOMA Navigate With Confidence

Society of Actuaries®

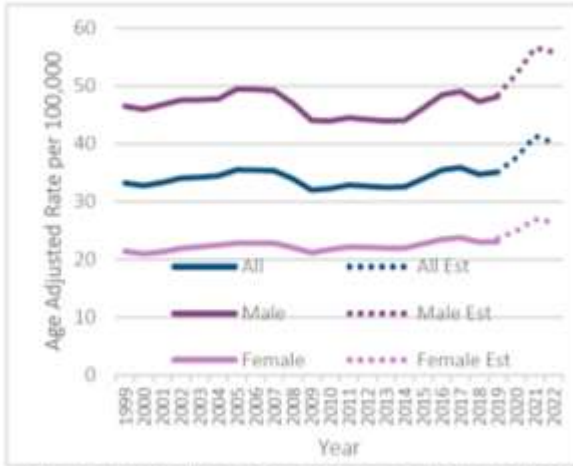
ACLI Financial Security for Life

Accidental deaths increased sharply in working ages.

- Accidents rose notably in 2020 and 2021.
- Drug overdoses explain most of the increase.
- Levels were above 2019 levels in 2022.

Figure 9

2022 ACCIDENTS EXLC OPIOIDS HISTORICAL MORTALITY RATES AND MORTALITY IMPROVEMENT BY SELECTED PERIODS



All Ages	Average Annual Improvement		Cumulative Improvement*	Average Annual Improvement *		
	1999-2009	2009-2019	2019-2022	2019-2020	2020-2021	2021-2022
All	0.4%	-0.9%	-14.4%	-7.1%	-9.8%	2.7%
Male	0.5%	-0.9%	-15.2%	-7.3%	-8.8%	1.3%
Female	0.1%	-0.9%	-11.8%	-5.5%	-7.9%	1.8%
Age Group (includes both sexes)						
< 1						
1 - 4			-14.9%	-1.8%	-14.7%	1.6%
5 - 14			-8.4%	-3.8%	-11.5%	6.2%
15 - 24	3.4%	2.2%	-10.4%	-13.6%	-3.8%	6.4%
25 - 34	0.5%	-0.3%	-20.2%	-17.1%	-8.3%	5.2%
35 - 44	0.6%	-1.1%	-23.0%	-13.4%	-12.9%	3.9%
45 - 54	-1.9%	-0.4%	-16.0%	-9.8%	-9.2%	3.3%
55 - 64	-0.5%	-3.0%	-19.7%	-8.2%	-10.4%	-0.2%
65 - 74	0.8%	-1.9%	-16.3%	-1.9%	-10.6%	-3.2%
75 - 84	-0.3%	-1.1%	-6.8%	1.8%	-7.5%	-1.2%
85+			-8.2%	-2.0%	-4.7%	-1.4%

* Estimated rates for 2019-2022 are derived using CDC WONDER death counts and modified population counts. 2019-2022 cumulative and average annual mortality improvement is derived with these rates. See Section 7 for details.

Source: U.S. Population Mortality Observations – Updated with 2022 Experience

LIMRA LOMA Navigate With Confidence

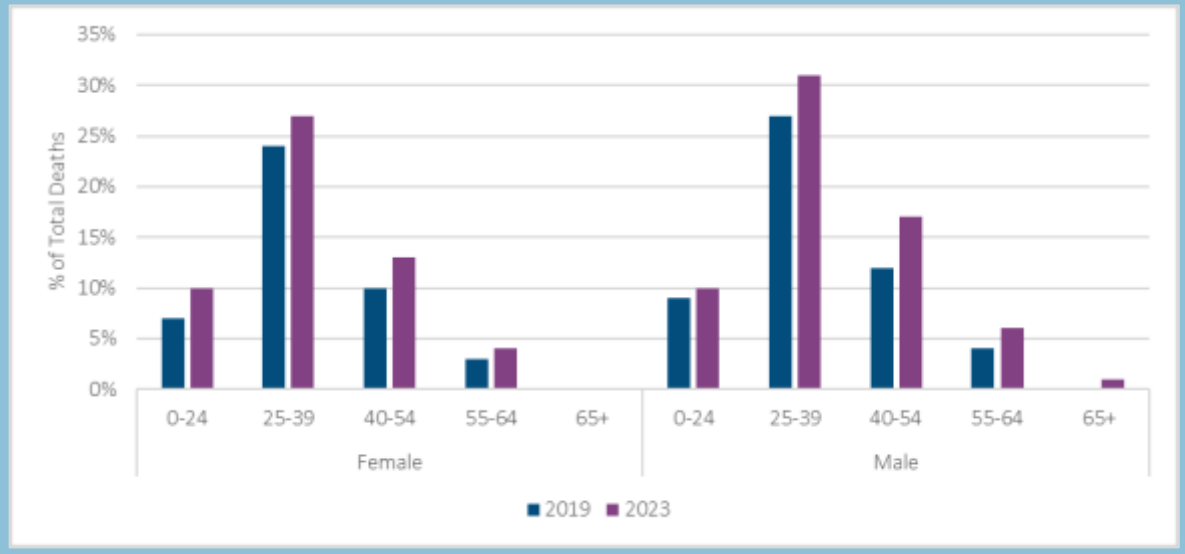
Society of Actuaries

ACLI Financial Security for Life

Drug overdoses represent a large share of ages 25–39 deaths.

- Overdoses account for up to 30 percent.
- The average overdose age is approximately 45.
- Overdose deaths occur at younger average ages.

Figure 5
DRUG OVERDOSE DEATHS AS % OF TOTAL DEATHS BY SEX AND AGE, U.S. GENERAL POPULATION, 2019 VS. 2023



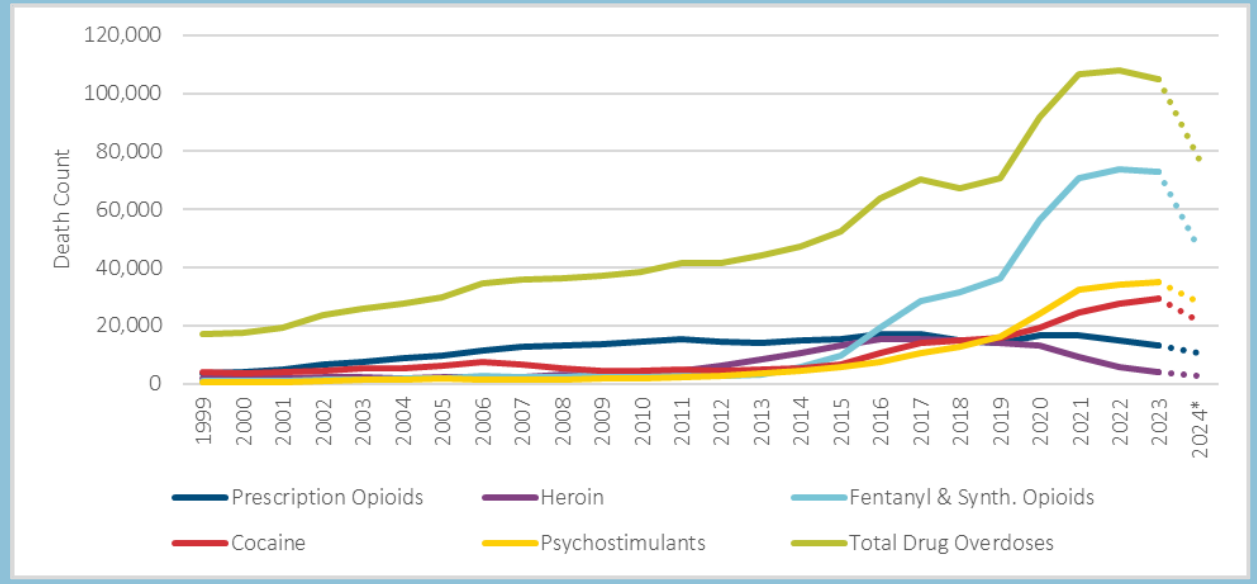
Source: U.S. Population Mortality Observations – Updated with 2022 Experience

LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life

The overdose epidemic evolved in distinct waves.

- Prescription opioids fueled early increases.
- Heroin drove the second wave of deaths.
- Fentanyl corresponded with a major shift.

Figure 2
COUNT OF DRUG OVERDOSE DEATHS INVOLVING SPECIFIC DRUG TYPES BY YEAR, U.S. GENERAL POPULATION, 1999-2024

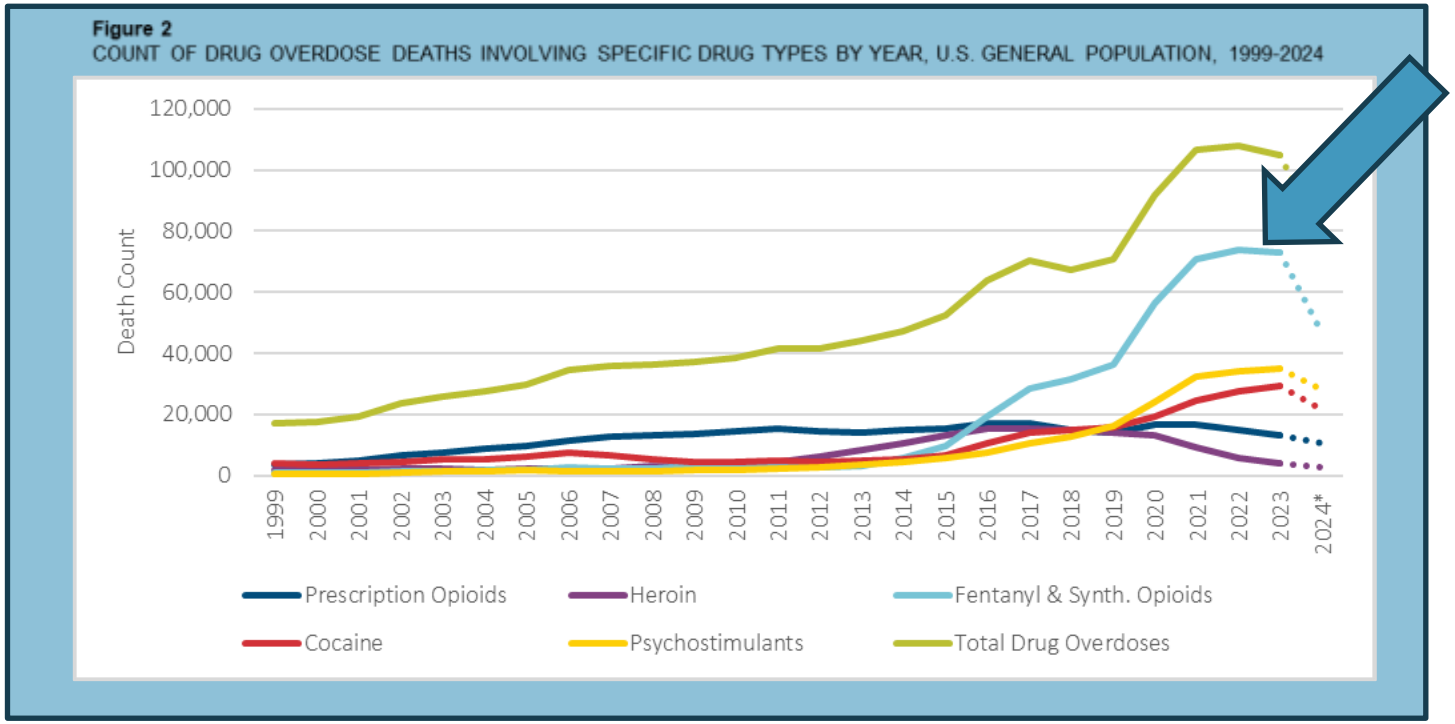


Source: U.S. Drug Overdose Crisis: Past, Present, and Future

LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life

Fentanyl has substantially altered recent mortality patterns.

- Synthetic opioids now drive most overdose deaths.
- Approximately 70 percent involve fentanyl.
- Higher potency is associated with higher fatality rates.



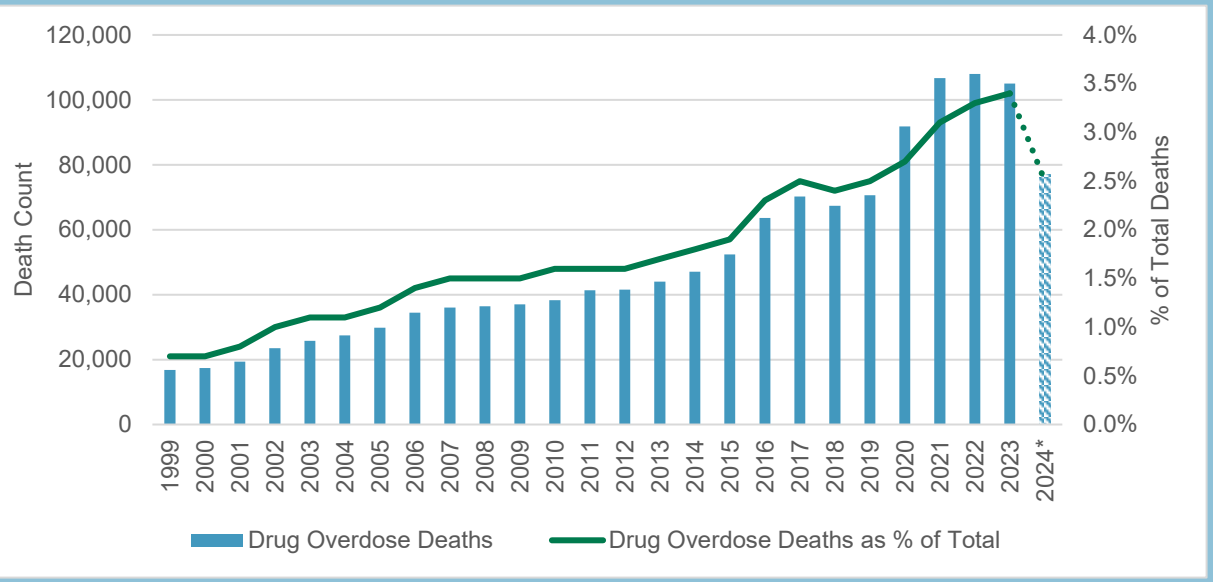
Source: U.S. Drug Overdose Crisis: Past, Present, and Future

LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life

Recent data show declines in overdose deaths.

- Overdose deaths peaked in 2021.
- Deaths declined during 2023.
- The durability of declines remains uncertain.

Figure 1
DRUG OVERDOSE DEATH COUNT AND % OF TOTAL DEATHS BY YEAR, U.S. GENERAL POPULATION, 1999-2024



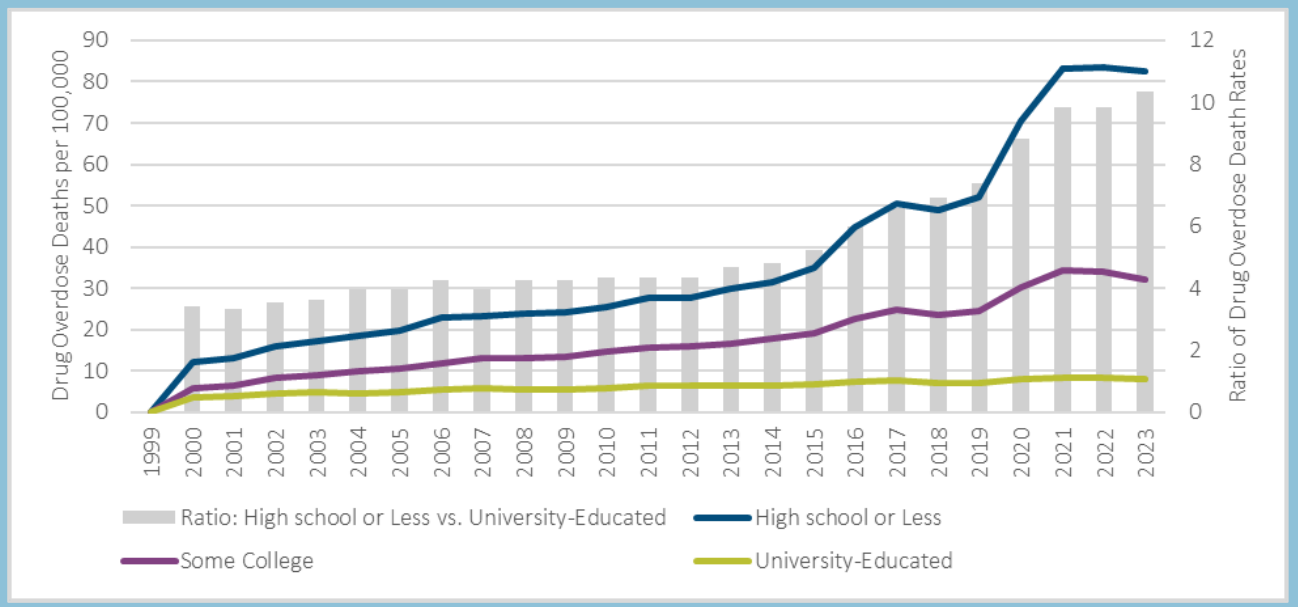
Source: U.S. Drug Overdose Crisis: Past, Present, and Future

LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life

Education stratifies overdose mortality risk.

- Lower education groups show higher mortality.
- The differential widened over time.
- Gradients are material at working ages.

Figure 3
DRUG OVERDOSE DEATH RATES BY EDUCATION LEVEL, U.S. GENERAL POPULATION, AGE 25+, 2000-2023



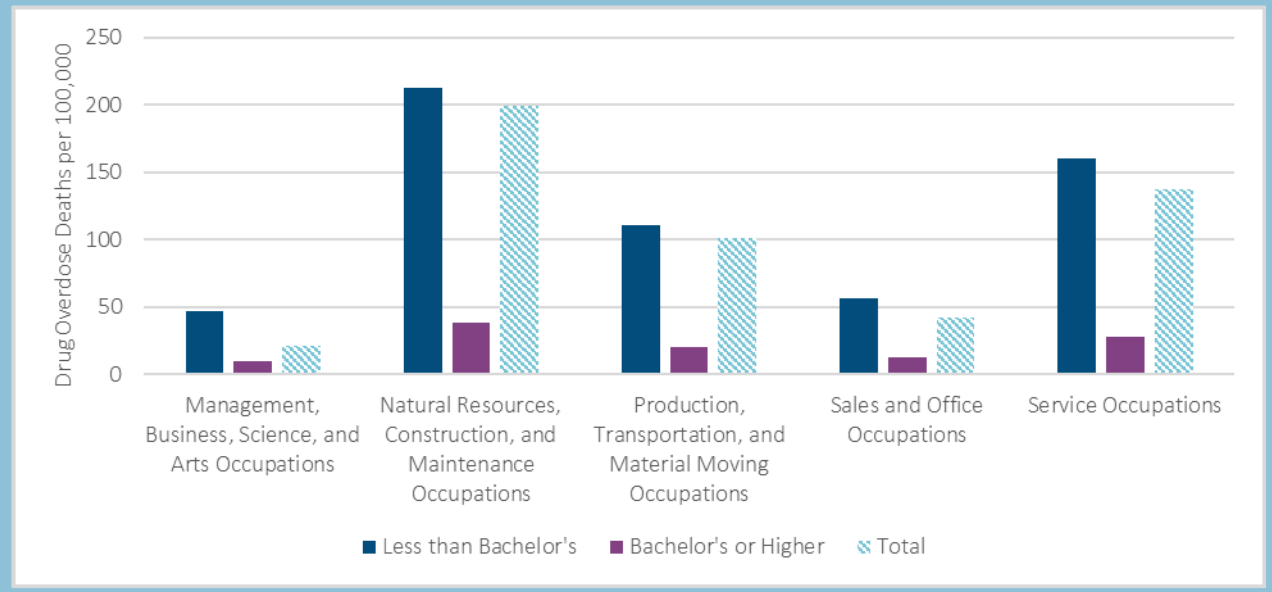
Source: U.S. Drug Overdose Crisis: Past, Present, and Future

LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life

Occupation correlates with overdose mortality risk.

- Construction occupations show higher mortality.
- Management occupations show lower mortality.
- Workplace injury may influence exposure.

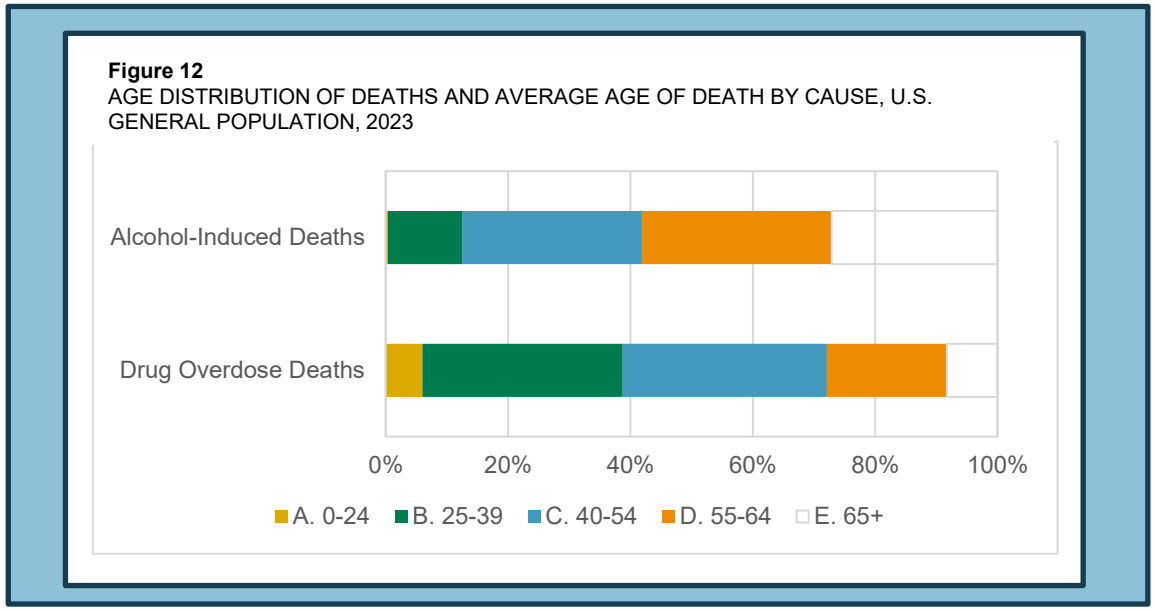
Figure 7
DRUG OVERDOSE DEATH RATES BY OCCUPATION AND EDUCATION, U.S. GENERAL POPULATION, AGES 25-64, 2023



Source: U.S. Drug Overdose Crisis: Past, Present, and Future

Alcohol shows a different working-age mortality pattern.

- Alcohol-induced deaths increased during COVID.
- Alcohol deaths skew older within working ages.
- Chronic disease mechanisms drive most alcohol mortality.

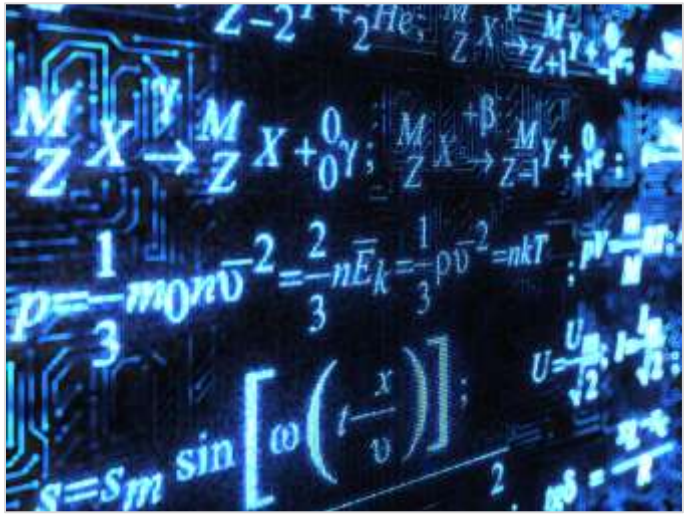


Source: U.S. Drug Overdose Crisis: Past, Present, and Future

LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life

Mental health mortality trends were also studied.

- The study modeled suicide and all-cause mortality.
- Socioeconomic context and geography were incorporated.
- Bayesian spatial methods were used.



Source: Quantifying the Effects of Mental Health on U.S. Suicide and Mortality Rates

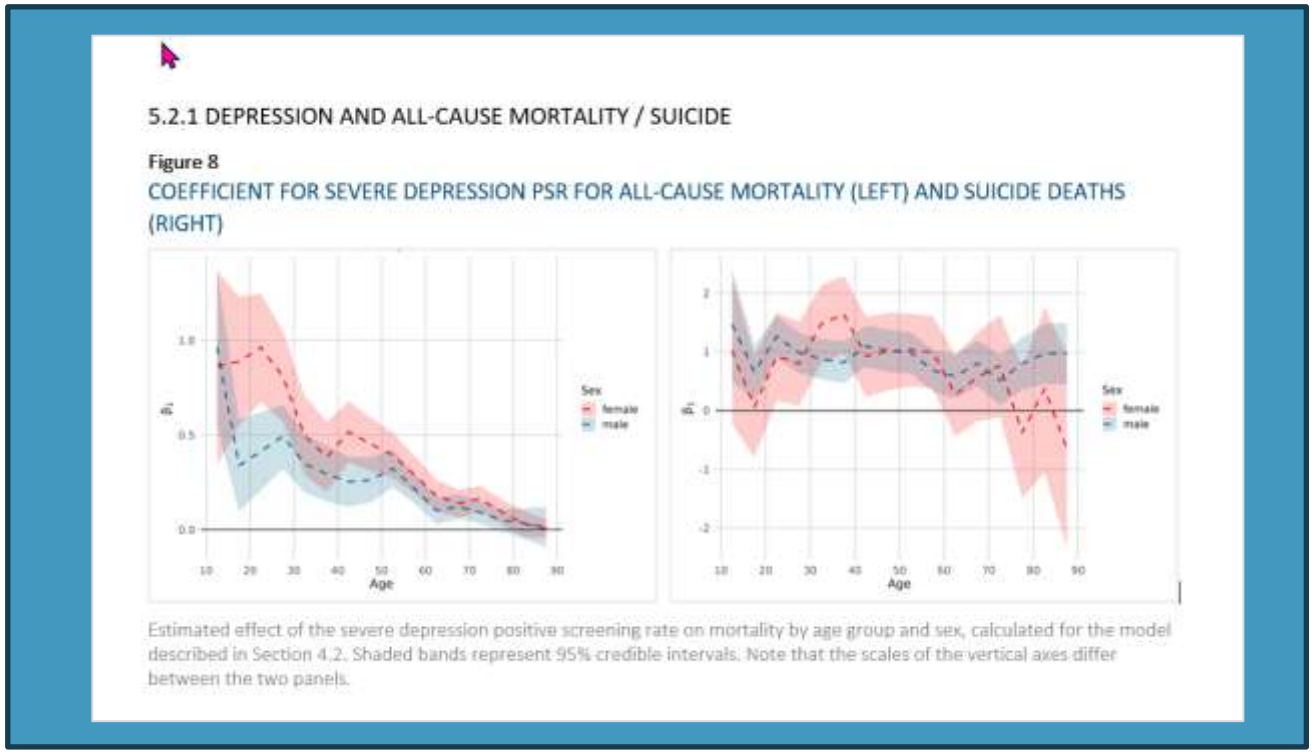
LIMRA LOMA Navigate With Confidence

Society of Actuaries

ACLI Financial Security for Life

Mental health indicators correlate with mortality risk.

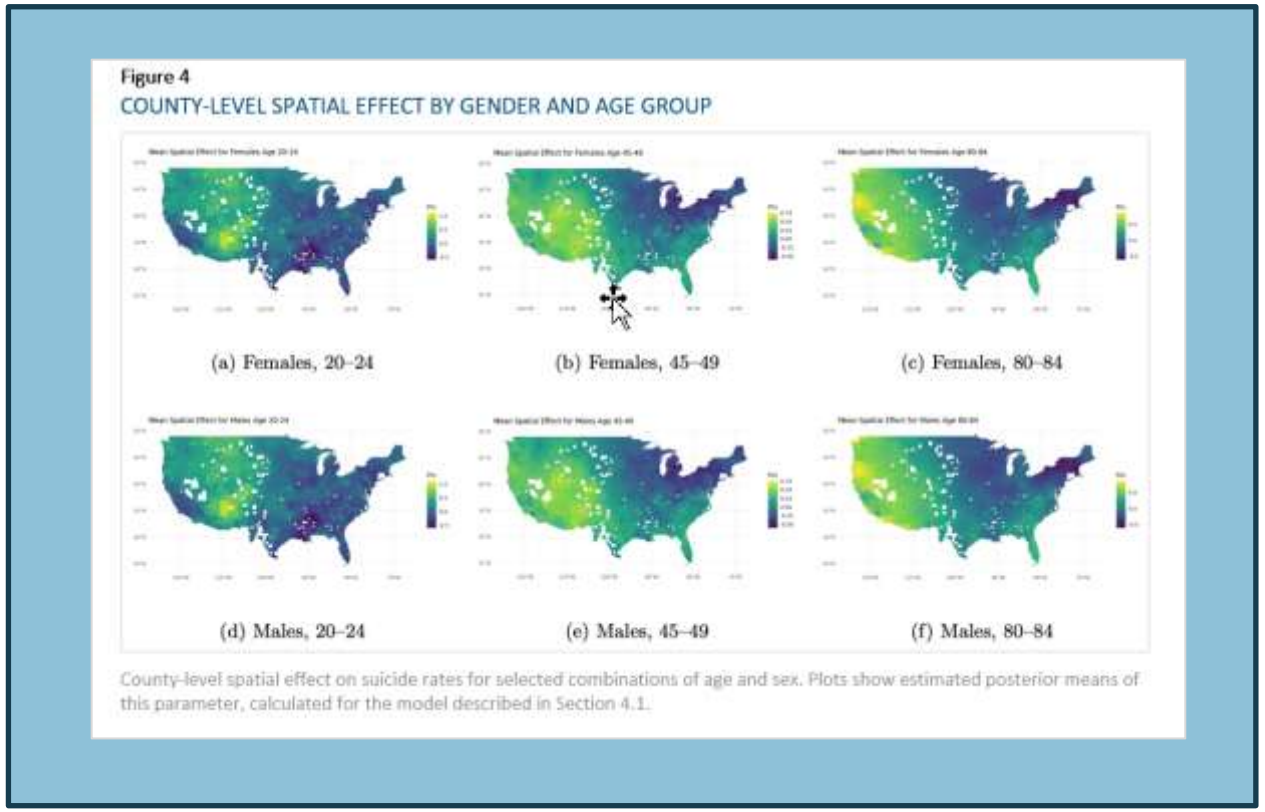
- Severe depression correlates with mortality.
- Effects are strongest among younger ages.
- Associations are population-level.



Source: [Quantifying the Effects of Mental Health on U.S. Suicide and Mortality Rates]

Suicide risk clusters geographically and persists.

- Suicide clusters in specific regions.
- Western states show elevated risk.
- Patterns persist across years.

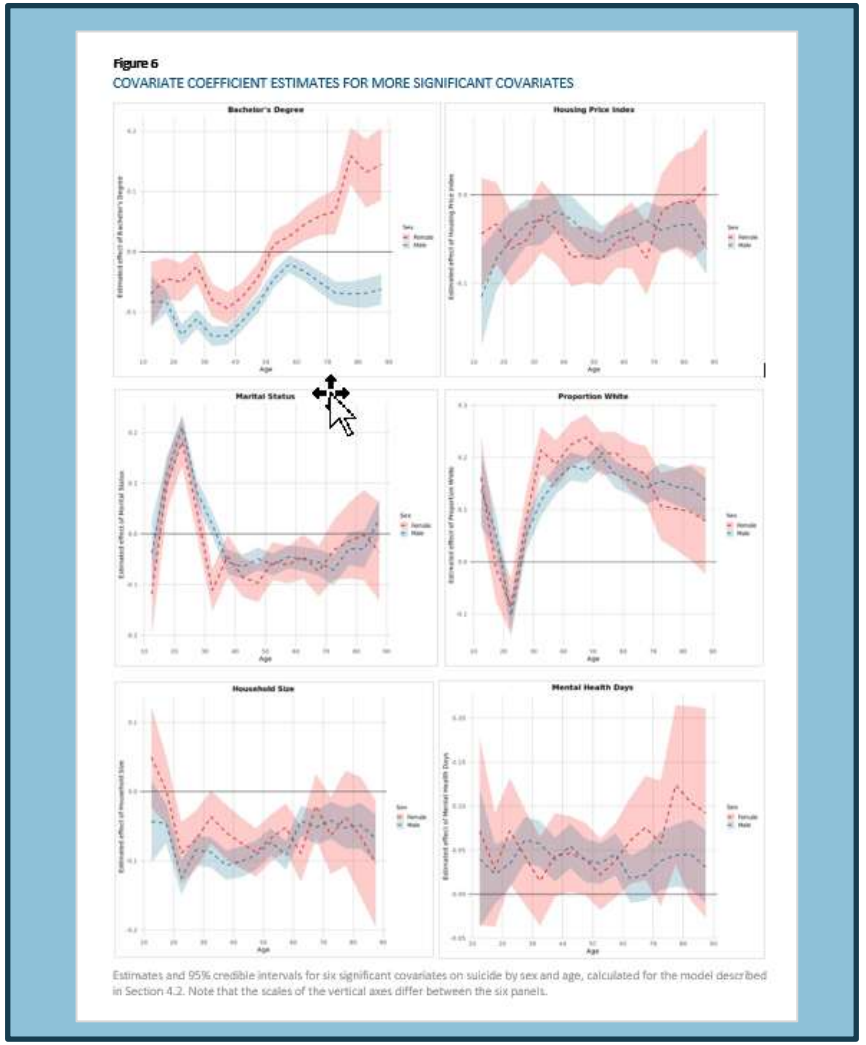


Source: Quantifying the Effects of Mental Health on U.S. Suicide and Mortality Rates

LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life

Socioeconomic context shapes suicide outcomes.

- Education levels are associated with different outcomes.
- Housing values correlate with lower risk.
- Marriage rates are linked to suicide outcomes.



Source: [Quantifying the Effects of Mental Health on U.S. Suicide and Mortality Rates]

Working-age mortality is increasingly behavior-driven.

- Behavioral causes shape mortality structure.
- Socioeconomic divergence continues widening.
- Mental health signals may help with forecasting.
- Emerging risks create forward uncertainty.

LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life

Disclaimer

This presentation is for educational purposes only and should not be construed as professional advice.

The opinions expressed are those of the presenter and not necessarily reflective of RGA or any organization associated with the presenter.

All comments are in reference to the following materials:

- https://www.rgare.com/docs/default-source/knowledge-center-articles/aom_weighing-the-evidence.pdf?sfvrsn=5f7374b4_13
- https://www.rgare.com/docs/default-source/knowledge-center-articles/evaluating-biometric-trend-drivers.pdf?sfvrsn=bfe2e693_9

LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life
RGA

LIMRA LOMA Navigate With Confidence

Society of Actuaries®

ACLI Financial Security for Life

RGA

RGA Research Overview

- Quantifies mortality and morbidity impacts of Anti-Obesity Medication (AOM) including GLP-1
  - Markets: U.S., UK, Canada, Hong Kong
  - Multiple adoption scenarios over ~20-year horizon
- Considerations include effectiveness, uptake, persistency and relative risk of mortality and morbidity
  - Quantifying impact on diabetic population also requires assumptions related to:
    - Prevalence of diabetes in the population
    - Effectiveness in diabetic population
    - Uptake in diabetic population
    - Relative risk of mortality and morbidity

LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life
RGA

Mortality Impact – Headline Results

MARKET	PESSIMISTIC	CENTRAL	OPTIMISTIC
US	1.0%	3.5%	8.8%
UK	0.5%	2.0%	5.3%
Canada	0.7%	2.6%	6.4%
Hong Kong	0.4%	1.4%	3.9%

US – 3.5% cumulative mortality improvements (central scenario) over 20 years

- Optimistic scenarios show materially larger impacts
- Largest effects observed at ages 45-59

LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life
RGA

AOMs will likely have smaller impact on population morbidity

- The reduction in critical illness incidence is smaller than reduction in mortality risk.
- Cumulative population morbidity improvement over 20 years (to 2045) due to AOMs.

Market	Pessimistic	Central	Optimistic
US	0.6%	1.8%	5%
UK	0.3%	1.0%	2.9%
Canada	0.4%	1.5%	4.2%
Hong Kong	0.1%	0.4%	1.2%

LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life
RGA

Insured vs General Population

- Insured population expected to see smaller absolute impacts
  - May have increased access to drugs but…has healthier baseline selection and lower obesity prevalence
- Meaningful benefit on population level mortality
- Assumptions may be too early to adjust, but does increase confidence in current improvement assumptions
  - Many assume mortality improvement exists

Speed of change can create uncertainties

- Lower cost to increase uptake – generic and oral formulations
- More effective newer versions
- Use cases may be widening
  - Wider range of conditions
  - Preventive medicine

Impact on Insurers

- Pricing/Reserving – assumption impact?
- New lapse risk – weight loss could drive insured to seek better terms
- Underwriting – consider BMI history, not just current BMI
- Claims – what are the disclosures and how will they be interpreted when claims come in

Key Learnings

- GLP-1s are a tangible future mortality improvement driver
  - Impacts are real but gradual
  - Too early for aggressive assumption changes
- Incorporate into scenarios and improvement sensitivities
- Underwriters: BMI less informative; focus on health trajectory
- Cross-functional monitoring is essential

Evaluating Biometric Trend Drivers

LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life
RGA

Importance of existing bases

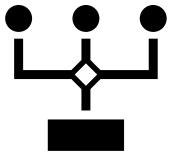
Basic 3 step process

Step 1 –

Model the historical mortality data to extract parameters or rates that can be forecast or extrapolated

Step 2 –

Determine a method for extrapolating those parameters or modeled improvement rates



Step 3 –

Make adjustments for known model limitations, basis differences or “one-offs”

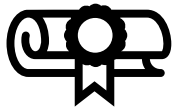
LIMRA LOMA Navigate With Confidence

Society of Actuaries

ACLI Financial Security for Life

RGA

Identify the drivers



Process - scan literature, attend conference, consult with experts

Contributors can increase or decrease future mortality

When evaluating driver, can consider:
-Magnitude of impact
-Proximity
-Probability

Be careful of including too much

LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life
RGA

Quantify the impact

Phase 1 – preliminary calculation of approximate value for triaging

Phase 2 – more detailed calculation if the approximate impact warrants further investigation

Considerations

- Rule out the immaterial quickly
- Transition may be gradual
- Balance between complex and robust
- Communicate and document decisions

LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life
RGA

Framework as face new drivers

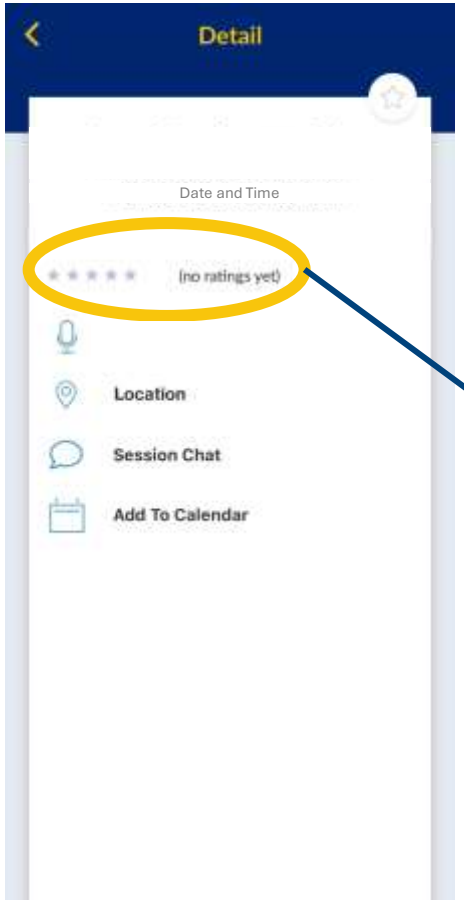
Ensure pathway for translating R&D into business value

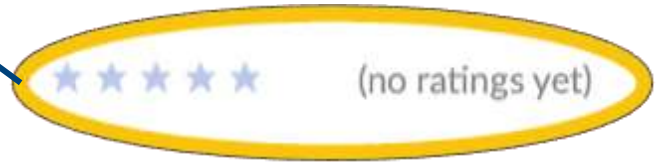
- Focus on top handful of drivers like to push basis changes
- Understand cause of death that may be impacted by key drivers
- Drivers with imminent and material impacts are more likely to deflect trends from anticipated trajectory than more distant impacts
- Allow for explicit modeling of drivers in short term projections, but taper this off over time and allow for more distant impact through altering long term rate
- Appreciate that mortality improvement basis already allows for future mortality improvement

We Value Your Feedback — Share It in the Conference App

Module Option

Agenda Option





LIMRA LOMA Navigate With Confidence
Society of Actuaries
ACLI Financial Security for Life

Thank You

LIMRA LOMA Navigate With Confidence

Society of Actuaries

ACLI Financial Security for Life