

Measuring Premature Mortality Among Kaiser Permanente Members Compared to the Community

A Brief Report

Elizabeth A. McGlynn, Ph.D.¹

Laura Dwyer-Lindgren, Ph.D.²

Anna C. Davis, Ph.D.¹

John L. Adams, Ph.D.¹

Ali Mokdad, Ph.D.²

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Author affiliations:

¹ Kaiser Permanente

² Institute for Health Metrics and Evaluation

Background

In its 2020-25 strategic plan, Kaiser Permanente (KP) committed to improving the health outcomes of its members and improving conditions for health in the communities in which it operates. Kaiser Permanente evaluated several potential measures that could be used to establish baseline performance and track progress on this goal. Premature mortality was one measure selected because it focuses greater attention on deaths that might be prevented through high quality diagnosis, early detection, and effective treatment which is consistent with the mission of KP as an integrated health system.

KP leaders considered whether to conduct the analysis internally or to engage a collaborator in the work. The Institute for Health Metrics and Evaluation (IHME)¹ was selected as a collaborator because it is a leading authority on measurement of population health outcomes, has a long history of working internationally to produce comparative outcome results, and had constructed county-level estimates of mortality in the US. The analysis presented here has been approved by all relevant Institutional Review Boards.

This brief report presents a summary of the relevant methods, describes results for cardiovascular disease- and cancer-related outcomes specifically, and highlights key assumptions and limitations.

Methods

Data Sources and Populations

Estimates of mortality in the KP member population are based on two sources of data:

- (1) Death and cause of death data for KP members, which are drawn from internal repositories of vital statistics records, social security administration death records, national death index records, and institutional death data. Specific data sources for each of the KP markets vary, but all include information on age, sex, location, year, and cause of death.² Deaths are included in this analysis if the individual was a KP member and either died during a membership period or within 90 days of loss of membership.
- (2) Demographic and enrollment data for all KP members by age, sex, and location, by year.

Small area estimation methods are applied to these data to estimate mortality by cause, market, year, age, and sex.

Estimates of mortality in the general population are drawn from IHME's county-level estimates of mortality in the US.³ These are based on two sources of data:

¹ <https://www.healthdata.org/>

² At the time of this analysis, data from the KP Georgia market were not available and are not included in the enterprise calculations.

³ Dwyer-Lindgren L, Kendrick P, Kelly YO, Sylte DO, Schmidt C, Blacker BF, et al. Life expectancy by county, race, and ethnicity in the USA, 2000–19: a systematic analysis of health disparities. *The Lancet*. 2022;400(10345):25–38. Dwyer-Lindgren L, Bertozzi-Villa A, Stubbs RW, Morozoff C, Kutz MJ, Huynh C, et al. US county-level trends in mortality rates for major causes of death, 1980-2014. *JAMA*. 2016;316(22):2385–401.

- (1) Cause of death recorded within the death certificate data compiled by the National Vital Statistics System maintained by the Centers for Disease Control and Prevention
- (2) Population demographic data from the National Center for Health Statistics

IHME leveraged small area estimation methods to generate estimates for the general population by cause of death, county, year, age, and sex. These county-level estimates were aggregated and weighted to reflect the distribution of KP membership in each county to produce estimates for the general population by KP market.

Finally, estimates of mortality among non-KP members in each market were generated by subtracting estimated deaths and population for the KP member population from estimated deaths and population for the general population.

Metrics

The metric selected for this work was premature mortality which is also known as Years of Life Lost (YLLs). The Box summarizes the concept and the approach to constructing the metric.

Box 1. Measuring Premature Mortality

Premature mortality is measured using the construct of ‘years of life lost’ or YLLs.

Conceptually, YLLs represent potential years of life that are lost when someone dies prematurely. YLLs are computed by multiplying the number of deaths at each age by a standard life expectancy at that age. The standard selected represents the normative goal for survival and is computed based on the lowest observed age-specific mortality rates across countries participating in IHME’s Global Burden of Disease project in an index year.

For both the KP member population and the non-KP member population in the communities in which KP operates, YLLs were computed from the estimated mortality rates using standardized life tables as described in Box 1.

Deaths and associated YLLs are attributed to a specific cause using International Classification of Diseases codes. Each death is attributed to a single cause in the Global Burden of Disease cause list; causes are mutually exclusive and grouped into a hierarchy that is collectively exhaustive.

Using these data sources and methods, IHME produced estimates of total and cause specific YLLs by KP market, year, age, and sex. Estimates were aggregated for males and females and across all KP markets, and then age-standardized to the US population.

Construction of Measures and Interpretation

To estimate the difference in YLLs among KP members and people living in communities in which KP operates (non-KP members), relative differences were calculated for 2018 (the most recent year available in all KP markets), using the following formula:

$$100 \cdot \frac{YLL\ rate_{non\ KP\ members} - YLL\ rate_{KP\ members}}{YLL\ rate_{non\ KP\ members}}$$

Relative differences are interpretable as likelihood comparisons, such as “KP members were xx% less likely to lose years of life due to cardiovascular diseases than non-KP members living in the communities we serve.”

Results

Table 1 summarizes the results reported in this brief report.

For KP members overall in 2018, the age-standardized YLL rate attributable to CVD was 2,266.5 per 100,000. The comparable rate for non-KP members in the communities in which KP operates was 3,392.7 per 100,000. This constitutes a relative difference of -33%.

For KP members overall in 2018, the age-standardized YLL rate attributable to cancer was 2,663.3 per 100,000. The comparable rate for non-KP members in the communities in which KP operates was 3,347.0 per 100,000. This constitutes a relative difference of -20%.

Table 1. Age-Standardized Years of Life Lost Rate per 100,000 Attributable to CVD and Cancer, for KP Members vs. Community Members, 2018.

Year	Condition	KP Members Estimate (per 100,000)	Community Members Estimate (per 100,000)	Relative Difference (%)
2018	Cardiovascular Diseases	2,266.5	3,392.7	-33.19
2018	Cancer	2,663.3	3,347.0	-20.43

Discussion

This analysis found that KP members experienced lower rates of premature death attributable to cardiovascular disease and cancer than people living in the communities in which KP operates.

Kaiser Permanente is known for its excellent preventive care in both cardiovascular disease and cancer. For example, rates of blood pressure control (a key contributor to heart attacks and strokes) in KP in 2018 were 79.6% compared to the national median of 59.9%. Rates of screening for colorectal cancer in 2018 were 76.8% compared to the national median of 62.3%; rates of screening for breast cancer were 83.8% compared to the national median of 76.8%.

This analysis is age standardized, and uses a comparator constructed at the county level. The analysis is descriptive and does not explore reasons for these differences; it is consequently not appropriate to conclude solely based on this analysis that the rate of premature deaths is lower among Kaiser Permanente members because of their enrollment in Kaiser Permanente. One potential difference between KP members and non-KP members is that all KP members are insured, with many having insurance by virtue of their employment (current or retired). By contrast, uninsurance rates vary from 3.9% to 12.7% in the communities in which KP operates. There could be other differences between the two groups for which this analysis does not adjust, and that may account for some of the differences in YLLs.