

Underwriting the Presidents

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The United States has had 43 presidents. We examined whether they survive significantly longer or shorter than their contemporaries. We found that survival was better for presidents elected in the 1789–1841 and 1933–2001 periods (SMRs of 0.7 and 0.6, respectively), but worse for those elected in 1845–1929 (SMR = 2.9). We also found increased mortality during the years lived in office (SMR = 1.4), but no increase in mortality after leaving office (SMR = 1.0).

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INTRODUCTION

The United States has had 43 presidents, including 1 man twice (Cleveland). There have been 8 deaths in office (Harrison, Taylor, Lincoln, Garfield, McKinley, Harding, Roosevelt, and Kennedy) and 30 after office, and 4 former or current presidents remain alive (Carter, GHW Bush, Clinton, and GW Bush).

We asked whether presidents survive significantly longer or shorter than their age- and sex-matched contemporaries, and if this depended on: 1) whether the president was currently in office; or 2) in what calendar year he was elected.

One might surmise that presidents – belonging to a higher social class, and receiving superior attention, medical care and protection – would have more favorable survival prospects. Further, it might be thought that only the self-appraised healthiest of politicians would run for office, and only those viewed as such by the populous would be elected. On the other hand, assassination is a unique risk to the office, and it has been suggested that the stresses of office and the political ambitions of the office-holder both carry excess risk.^{1,2}

A comprehensive insurance company study, almost 30 years ago (1980), examined the survival of presidents, vice-presidents,

Table 1. Presidential Comparative Mortality

Subset	O	E	SMR	95% C.I.	χ^2	p
Overall	38	35.5	1.07	(0.76, 1.47)	0.18	0.6748
During office	8	5.6	1.42	(0.62, 2.81)	1.01	0.3160
After office	30	29.9	1.00	(0.68, 1.43)	0.00	0.9822
First 10 presidents (1789–1841)	10	14.2	0.71	(0.34, 1.30)	1.23	0.2670
Second 10 presidents (1845–1881)	10	3.6	2.80	(1.34, 5.15)	11.57	0.0007
Third 10 presidents (1881–1929)	9	2.9	3.12	(1.42, 5.94)	13.00	0.0003
Last 13 presidents (1933–2001)	9	14.9	0.61	(0.28, 1.15)	2.32	0.1281

and unsuccessful candidates.³ They found risks elevated in some time periods and diminished in others. We discuss this below, after reporting our more recent results.

Our methods were standard:

- The expected annual mortality rates for each person were based on life tables⁴ for the nearest decennial year 1850–2000, and the person's integer age during that calendar year. This approach is equivalent to use of a cohort (generation) life table, as in the prior insurance study.³ The choice of estimated rates for the years 1790–1840, where general population mortality rates were not readily available, did not significantly affect the results.⁵
- The expected number of deaths for each person was computed as the sum of the expected rates during their survival times, prorated in the last year.
- The standardized mortality rate (SMR), the ratio of the observed number of deaths (O) to the expected number (E), was computed for each group or subgroup of interest.
- Confidence intervals for the SMRs were computed using the Poisson values reproduced by Singer.⁶

RESULTS

Results are shown in Table 1. The overall SMR was $38/35.5 = 1.07$, indicating that overall mortality was slightly higher for presidents than expected in the contemporaneous general population. The SMR for person-years in office was $8/5.6 = 1.42$. In

both cases, the excess dissipates if the 4 assassinations (Lincoln, Garfield, McKinley, and Kennedy) are excluded.

The SMR for person-years lived after leaving office was $30/29.9 = 1.00$. Not shown in the Table are the SMRs for presidents elected prior to 1900 ($24/19.1 = 1.25$), and for presidents elected since 1900 ($14/16.4 = 0.86$). None of the preceding 5 results were statistically significant at the 5% level.

But these overall figures masked some dramatic differences that are readily apparent if we divide the presidents further. Here we choose 4 groups: the first 10, second 10, third 10, and remaining 13 (9 deaths, 4 still alive). These are subsequently referred to as the early, middle (2), and late groups.

As can be seen in Table 1, SMRs for the early and late groups were less than 1.0, but not statistically significant. SMRs for the middle 2 groups were markedly increased, at 2.9 and 3.1, respectively, and both were statistically significant at the 0.001 level. The early/late and middle periods were clearly different.

The 1980 insurance study³ (Table 5) reported a mortality ratio (MR) of 0.75 for presidents taking office 1789–1844. This is quite similar to our SMRs of 0.71 for 1789–1841 (shown above) and 0.77 for 1789–1844 (not shown). Those authors also reported MRs of 2.88 for 1845–1884, 1.51 for 1885–1932, and 1.18 for 1933–1979, all consistent with our results.

The above results are not an artifact of the data or methods. Indeed, the simplest possible analysis of survival for the same groups, presented in Table 2 below, suggests the

Table 2. Analysis of Survival

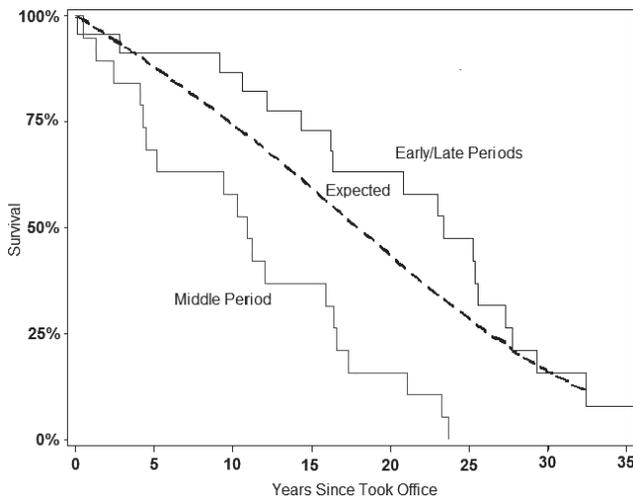
Subset	Average Age on Taking Office	Average Age at Death	Average Survival Time After Taking Office
First 10 presidents	59	78	19
Second 10 presidents	54	64	10
Third 10 presidents	52	64	12
Last 13 presidents	56	76	20

same 2 conclusions: 1) the early and late groups are quite similar in average survival time and age at death, as are the 2 middle groups; and 2) the early and late groups differ markedly from the middle groups.

A third clear way to see the dramatic difference between the Early/Late and Middle periods is by plotting the actual and expected survival experiences. The Figure shows the 2 Kaplan-Meier survival curves,⁷ along with the expected survival curve for the entire group,⁸ constructed using the methods detailed in Finkelstein et al.⁹ The Early/Late survival is significantly better than the Middle (Log-Rank Test, $p = 0.0001$), the Middle is different than the Expected ($p < 0.0001$), but the Early/Late is not statistically significantly different than Expected ($p > 0.05$).

DISCUSSION

There is nothing unique about the divisions (early, middle, late) used here. In fact,



Kaplan-Meier survival curves.

“cut points” could have been chosen to minimize or maximize the SMRs (for example, the SMR for the first 4 presidents was 0.46, though with a large standard error). Further, the SMR results could have been reported by calendar year of exposure, rather than by calendar year of entry into office. For those interested, the workbook of raw data and the calculations is available.¹⁰

We now comment briefly on the findings.

- It has been asserted that the founding fathers were unique in many ways; longevity may be one of them. Perhaps they were elected in part because of their known physical vitality, in which case the SMR of 0.71 is a reflection of their being elected to office, not a result of it.
- Mortality during the middle periods was much higher than the general population. Even if the 3 assassinations were removed, the SMR remains high at $(10+9-3)/(3.6+2.9) = 2.46$. It is beyond the scope of the present paper to discuss the detailed causes of death in the remaining 16 cases (and indeed a thorough analysis of this may require individual presidential biographers), but it may be that these were related to the stress of serving the country during the period of a civil war, a world war, and several major economic depressions.
- That the presidents tend to live longer in recent times (SMR = 0.61) could be related to the factors suggested at the outset: belonging to a higher social class, and receiving superior attention, medical care and protection. But if so, why was this effect not observed in the early and middle periods?

- Lastly, it bears repeating that 10% (4 of 43) of the presidents were assassinated during office. This rate is markedly higher than that of the heads of state of any other Western democracy over a comparable time span. Underwriters may consider a flat extra for sitting presidents.

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