

Life Expectancy, Mortality, and Survivorship: Student Research at Vale Cemetery in Schenectady, New York

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Introduction

How did life expectancy, mortality, and overall health conditions change over time in Schenectady? What factors contributed to these changes?

Students enrolled in CLS202: *Introduction to Archaeological Methods* at Union College in Spring 2019 examined these questions by carrying out demographic research at Vale Cemetery in Schenectady. Dedicated in 1857, the cemetery is currently home to over 33,000 graves and remains an active burial place. Students tested two hypotheses about the population performance values of those buried at Vale Cemetery:

- 1) Females have higher age-specific survivorship, lower age-specific mortality, and longer age-specific life expectancy than do males.
- 2) People who died after the start of the 20th century have higher age-specific survivorship, lower age-specific mortality, and longer age-specific life expectancy than those who died before the 20th century.

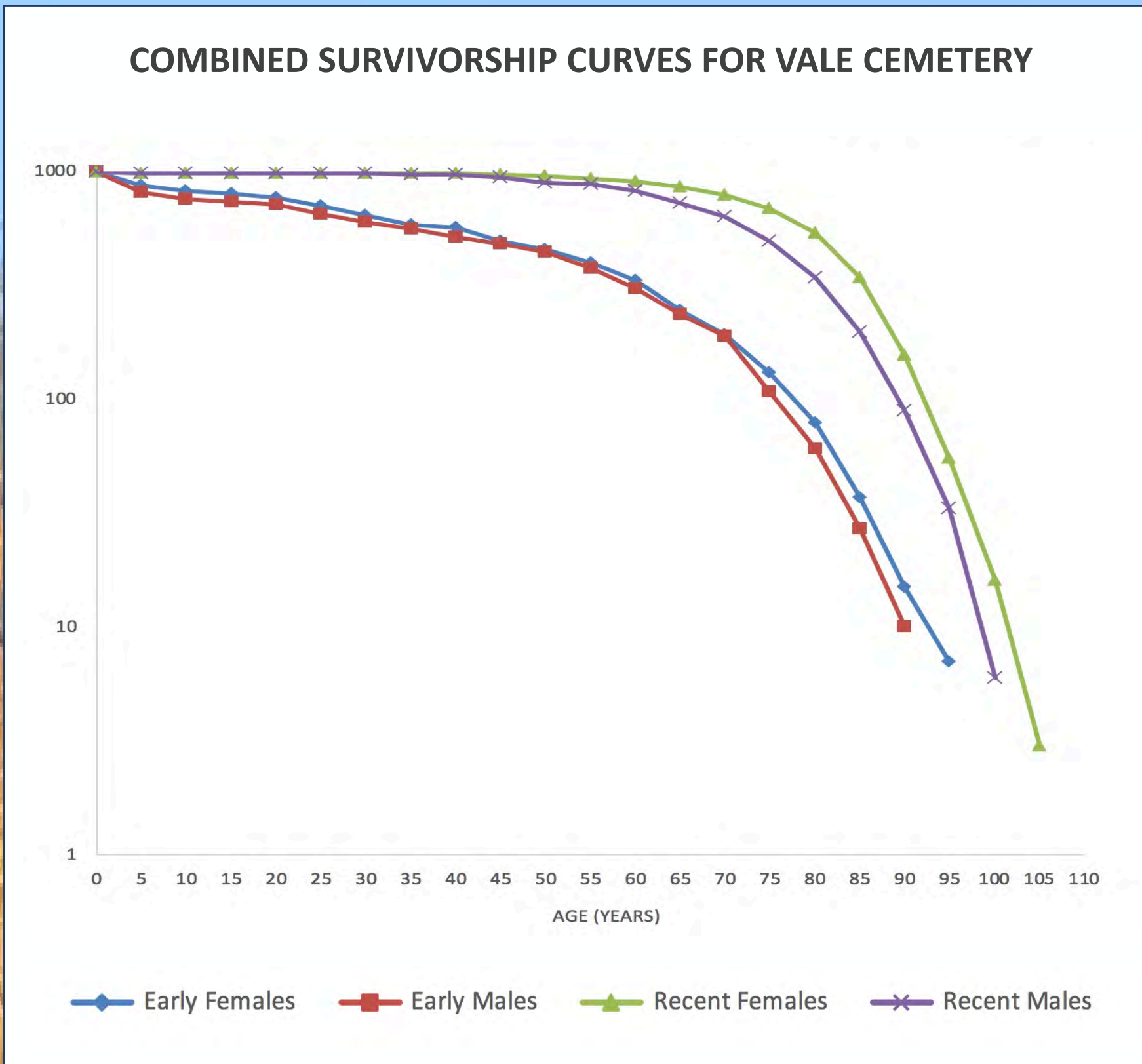
Students also considered the broader implications of their results by studying how differences in income, education, race, and gender still contribute to dramatic inequalities in life expectancy and health, in Schenectady and throughout the United States and the world.

Fieldwork, Methods, and Results

Age Class	Early Females	Early Males	Recent Females	Recent Males
0	43.17	40.35	77.91	71.75
5	44.51	43.95	73.90	67.73
10	41.82	42.08	68.90	63.10
15	38.11	38.16	63.90	58.10
20	34.33	34.34	58.90	53.25
25	32.02	32.47	53.90	48.40
30	29.94	30.18	48.90	43.40
35	27.76	27.20	44.03	38.75
40	23.59	24.31	39.25	33.96
45	21.63	20.85	34.54	29.70
50	18.20	17.39	30.07	25.97
55	15.57	14.91	25.84	21.56
60	13.24	12.78	21.45	17.79
65	11.82	10.86	17.61	14.84
70	9.56	7.95	13.91	11.69
75	7.79	7.03	10.61	9.28
80	6.31	5.56	7.82	7.26
85	5.50	4.38	5.86	5.74
90	5.00	2.50	4.83	4.69
95	2.50	(-)	4.17	3.33
100	(-)	(-)	3.33	2.50
105	(-)	(-)	2.50	(-)
110	(-)	(-)	(-)	(-)

Life expectancy (mean expectation of further life), by 5-year age class, of the sampled population buried at Vale Cemetery.

Mortality rate, by 5-year age class, of the sampled population buried at Vale Cemetery.



Combined survivorship curves for the sampled population buried at Vale Cemetery. A survivorship curve shows the proportion of individuals surviving into each 5-year age class.

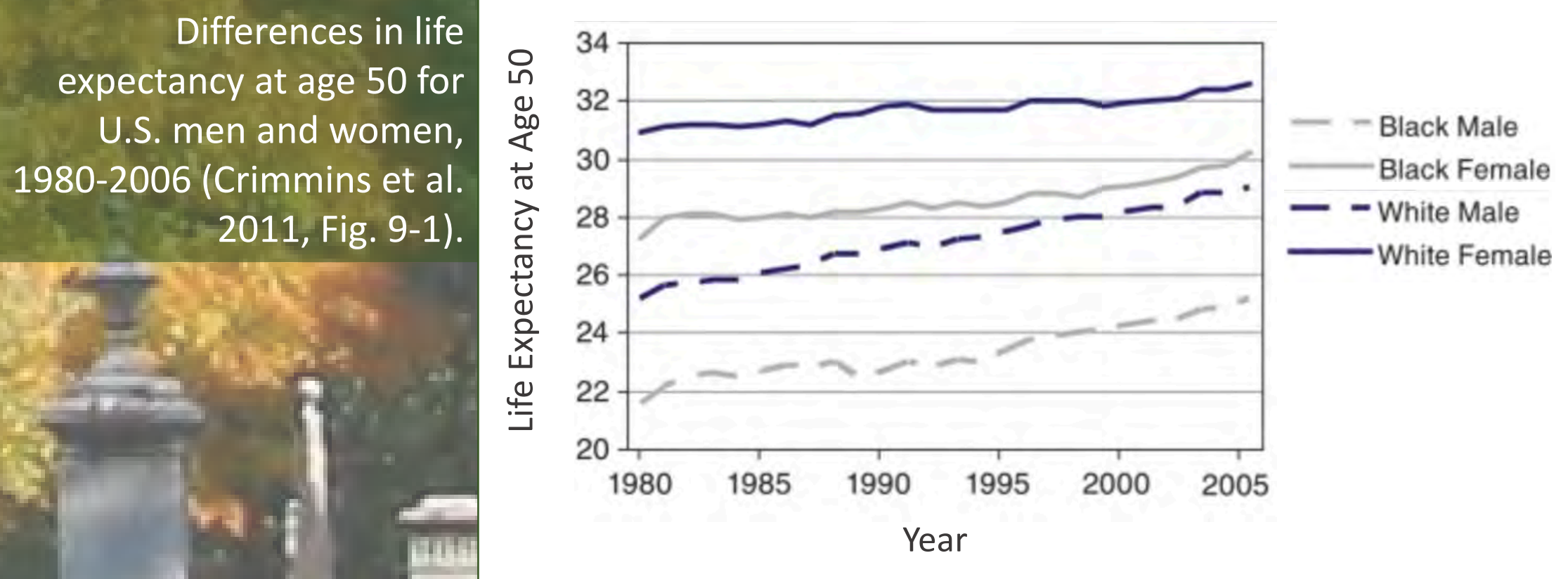
Age Class	Early Females	Early Males	Recent Females	Recent Males
0	13.5%	18.5%	1.3%	1.4%
5	5.2%	7.0%	0.0%	0.6%
10	3.2%	2.7%	0.0%	0.0%
15	3.3%	3.2%	0.0%	0.3%
20	7.8%	9.0%	0.0%	0.3%
25	9.0%	8.3%	0.0%	0.0%
30	9.3%	6.8%	0.3%	0.9%
35	3.2%	7.9%	0.5%	0.6%
40	12.6%	6.6%	0.8%	2.3%
45	7.6%	7.7%	1.6%	4.4%
50	13.1%	14.5%	2.7%	2.5%
55	17.0%	18.8%	2.5%	6.0%
60	25.0%	23.1%	5.8%	11.8%
65	22.7%	20.0%	8.0%	13.0%
70	31.4%	42.9%	13.0%	22.0%
75	40.0%	43.8%	21.4%	30.5%
80	52.4%	55.6%	36.4%	42.3%
85	60.0%	62.5%	54.2%	54.9%
90	50.0%	100.0%	65.0%	62.5%
95	100.0%	(-)	71.4%	83.3%
100	(-)	(-)	83.3%	100.0%
105	(-)	(-)	100.0%	(-)
110	(-)	(-)	(-)	(-)

Broader Significance

The results of the Vale Cemetery project underscore how different communities suffer from major inequalities in life expectancy, mortality, and overall health, not only in Schenectady, but across the country and the world. Though the disparities we observed were due largely to differences in medical knowledge and treatment, they are ultimately rooted in education and access to healthcare. Studies of the modern U.S. population have demonstrated that differential access to healthcare – correlated to differences in income, education, race, and gender – results in drastic inequalities when it comes to such basic aspects of well-being such as how long one can expect to live. Historical research provides long-term perspectives with the potential to fuel policy change.

e _x	Males Years of Education			Females Years of Education			Both Sexes Combined Years of Education		
	0-8	9-12	13+	0-8	9-12	13+	0-8	9-12	13+
20	51.2	52.0	59.4	57.7	58.4	62.7	54.2	55.4	61.0
30	42.5	43.0	49.7	48.2	48.8	52.8	45.2	46.2	51.2
40	33.6	34.1	40.2	38.9	39.5	43.1	36.1	37.0	41.6
50	25.3	25.8	30.9	29.8	30.5	33.7	27.4	28.4	32.2
60	18.0	18.4	22.2	21.6	22.1	24.6	19.8	20.5	23.4
70	12.2	12.2	14.6	14.6	14.6	16.4	13.5	13.7	15.5
80	7.6	7.5	8.5	8.6	8.5	9.1	8.2	8.1	8.8

Life expectancy by 10-year age class and years of education for the U.S. at the end of the 1990s (Crimmins et al. 2011, Table 9-1).



References

<http://valecemetery.org>
Crimmins, E.M., S.H. Preston, and B. Cohen (eds.), 2011, *Explaining Divergent Levels of Longevity in High-Income Countries*, Washington, D.C.: National Academies Press.

Working in teams of two, students collected demographic data from the gravestones at Vale Cemetery. They separated each recorded individual into two time periods: “early,” corresponding to a date of death before 1890, and “recent,” corresponding to a date of death after 1929. They then recorded the age of death in years and the gender, based on the name, for each individual. The data were thereby grouped into four populations: early females, early males, recent females, and recent males. We discussed limitations in the data, such as gravestones of children with no age or name provided, illegible inscriptions, and assumptions about gender made based on name. Altogether, 1307 individuals were recorded, providing a relatively robust sample size.

Students used the data to create life tables and survivorship curves for each of the four populations. Life tables are a convenient way to describe age-specific survivorship, mortality, and life expectancy for a population. The major results of the project are presented above. Both hypotheses were supported: the female populations had higher age-specific survivorship, lower age-specific mortality, and longer age-specific life expectancy than the male populations, and those who died in the 20th century similarly “out-performed” those who died earlier than the 20th century. The most dramatic differences were observed between the early and recent populations. For those who died after the start of the 20th century, **mean life expectancy at birth increased by at least 30 years**. This striking increase is due largely to a severe drop in infant mortality: **13.5-18.5% of infants in the early population died before reaching 5 years of age**, compared to only 1.3-1.4% of infants in the recent population. The combined survivorship curves showing all four populations provide a particularly effective visual representation of these disparities, most of which are based on differential access to medical knowledge, safe medical procedures, and overall healthcare.

Acknowledgements

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