

The Roseto Effect: A 50-Year Comparison of Mortality Rates

ABSTRACT

Objectives. Earlier studies found striking differences in mortality from myocardial infarction between Roseto, a homogeneous Italian-American community in Pennsylvania, and other nearby towns between 1955 and 1965. These differences disappeared as Roseto became more "Americanized" in the 1960s. The present study extended the comparison over a longer period of time to test the hypothesis that the findings from this period were not due to random fluctuations in small communities.

Methods. We examined death certificates for Roseto and Bangor from 1935 to 1985. Age-standardized death rates and mortality ratios were computed for each decade.

Results. Rosetans had a lower mortality rate from myocardial infarction over the course of the first 30 years, but it rose to the level of Bangor's following a period of erosion of traditionally cohesive family and community relationships. This mortality-rate increase involved mainly younger Rosetan men and elderly women.

Conclusions. The data confirmed the existence of consistent mortality differences between Roseto and Bangor during a time when there were many indicators of greater social solidarity and homogeneity in Roseto. (*Am J Public Health.* 1992; 82:1089-1092)

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Introduction

Previous studies of social correlates of health and longevity have focused mainly on ethnic, occupational, or demographic characteristics rather than on the social character and group dynamics of an identified community. An exception is the study of Roseto, Pennsylvania, an Italian-American town in eastern Pennsylvania that from 1955 to 1965 was found to have had a strikingly low mortality rate from myocardial infarction relative to Bangor, an immediately adjacent town, and three other nearby communities.^{1,2} The usually accepted risk factors were at least as prevalent in Roseto as in the two control communities that were studied in detail.^{3,4} At the time, Roseto, which had been settled by immigrants from a town in southern Italy in 1882, still displayed a high level of ethnic and social homogeneity, close family ties, and cohesive community relationships.

Beginning in 1962, Roseto became the object of detailed inquiries into its history and social traditions and the attitudes, behavior, health habits, and medical status of its residents. For comparison, the adjacent community of Bangor (which, throughout what became a 50-year period under study, was served by the same water supply, physicians, and hospital facilities as Roseto) and the nearby town of Nazareth were studied in similar fashion. Data from these studies and many years of participant observation yielded evidence that the discrepancy in the prevalence of and mortality from myocardial infarction might be attributed to important differences in culture and social cohesion among the three communities.¹⁻⁵ It was hypothesized that Roseto's stable structure, its emphasis on family cohesion, and the supportive nature of the community

may have been protective against heart attacks and conducive to longevity. However, by the early 1960s there were indications of impending change in the community.⁵ Interviews with many Rosetans between the ages of 25 and 35 and with the teenagers indicated that they were prepared to largely abandon their old community ways in favor of the more typically American behavior of neighboring communities.

In 1963, after the initial period of study, the investigators made a prediction that the loosening of family ties and community cohesion would be accompanied by loss of relative protection of Rosetans from death due to myocardial infarction.⁴ By the late 1960s and early 1970s the predicted social change was evident, as was the predicted increase in incidence of myocardial infarction. These changes were reflected in greater prevalence of myocardial infarction among the living and in higher mortality rates.^{2,13,14}

The earlier beliefs and behavior that expressed themselves in Roseto's family-centered social life, absence of ostentation even among the wealthy, nearly exclusive patronage of local business, and a predominance of intra-ethnic marriages gradually changed toward the more familiar behavior pattern of neighboring commu-

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TABLE 1—Age-Adjusted Mortality Rates (MR) per 1000 and Number of Deaths for Roseto and Bangor Residents over 35 Years of Age

	1935–1944		1945–1954		1955–1964		1965–1974		1975–1984	
	MR	No. of Deaths	MR	No. of Deaths	MR	No. of Deaths	MR	No. of Deaths	MR	No. of Deaths
Myocardial infarction										
Bangor men	39.7	49	64.9	94	75.2	118	82.6	137	76.3	124
Roseto men	23.0	6	43.0	13	49.6	19	94.6	36	78.5	38
Bangor women	23.5	30	27.4	48	38.5	78	33.6	88	34.5	101
Roseto women	12.5	3	19.1	6	25.0	10	36.1	18	36.6	27
Congestive heart failure										
Bangor men	53.9	67	37.4	56	28.6	47	34.7	60	16.9	27
Roseto men	43.9	11	31.3	10	25.3	10	29.5	11	8.6	5
Bangor women	50.3	64	31.3	56	29.7	65	23.9	64	15.1	51
Roseto women	52.9	12	42.3	13	23.5	10	26.5	13	13.2	11
Myocardial infarction and congestive heart failure										
Bangor men	93.6	116	102.3	150	103.8	165	117.2	197	93.2	151
Roseto men	66.8	17	74.3	23	74.9	29	124.1	47	87.0	43
Bangor women	73.8	94	58.6	104	68.2	143	57.5	152	49.6	162
Roseto women	65.4	15	61.4	19	48.5	20	62.6	31	49.8	38
All causes										
Bangor men	242.0	299	209.8	306	217.8	346	244.1	406	222.4	351
Roseto men	186.9	48	179.9	57	174.0	66	262.8	100	172.5	82
Bangor women	202.0	257	141.6	247	158.0	326	127.7	317	124.3	359
Roseto women	193.0	46	159.5	50	125.1	51	150.0	75	93.9	70

nities. Roseto was shifting from its initially highly homogeneous social order—made up of three-generation households with strong commitments to religion and to traditional values and practices—to a less cohesive, materialistic, more “Americanized” community in which three-generation households were uncommon and inter-ethnic marriages became the norm.¹⁵

The “Roseto Effect” has been widely cited as evidence for the positive effects of social cohesion and social support on longevity.^{6–12} In order to reexamine the possibility of bias in the mortality data due to the small population size of Roseto (approximately 1600 during the time of the study, with the Bangor population numbering more than 5000), and to test the possibility that the relative differences in mortality rates from one decade to another were due to random fluctuations in the number of deaths in each town, we examined 3859 death certificates from Roseto and Bangor from 1935 to 1985.

Method

With the help of the Bureau of Vital Statistics in the Pennsylvania Department of Health, we were able to obtain and individually examine all death certificates of inhabitants of Roseto and Bangor who died between 1935 and 1985. Because pre-1960 certificates had to be retrieved man-

ually, we were concerned about the completeness of our data. We therefore examined all obituary notices in the local newspaper as well as church death records for the entire time period of this study; we were thus able to identify and obtain the records of residents whose certificates had not been filed or retrieved appropriately. Obituaries and church records also made it possible to identify and obtain the death certificates for Roseto and Bangor residents who had died while they were traveling outside of Pennsylvania.

Diagnostic Criteria

The criteria for the diagnosis of death from myocardial infarction included all instances when myocardial infarction was listed on line one of the death certificate as “immediate cause of death” or when “sudden death” was listed in that space and myocardial infarction, ischemic heart disease, arteriosclerotic cardiovascular disease, coronary heart disease, or similar phrases were used in the “due to” lines.

Criteria for the diagnosis of congestive heart failure included the listing of congestive heart failure, chronic ischemic heart disease, chronic myocarditis, cardiomyopathy, and similar phrases as immediate cause of death, accompanying the listing of atherosclerosis or arteriosclerosis as a contributing cause.

Age Adjustment and Standardization

Mortality rates in the two towns were standardized for age, using as the standard population the sum in each age group in Roseto and Bangor in 1940. Rates were computed for deaths from myocardial infarction, congestive heart failure, and all causes. The ratio of Roseto to Bangor rates was then calculated, and statistical significance was assigned to differences at the 95% confidence level.¹⁶

Since the focus of our interest was coronary disease, age-adjusted death rates were computed only for those aged 35 and older. Rates were based on 10-year averages over the period 1935 to 1985, using the 5 years on either side of an official census count, with the census figures as the denominator. Although the age composition of the two populations changed dramatically over time, standardization of the rates takes this into account. (See the Appendix for complete census data.)

Results

Table 1 presents age-adjusted mortality rates from myocardial infarction, congestive heart failure, the two combined, and for all causes for the two communities over the course of five decades. The mortality rate for myocardial infarction among Roseto men and women was initially very low but showed a progres-

TABLE 2—Age-Specific Death Rates Per 1000 from Myocardial Infarction, Roseto Men and Women, 1955 to 1974

	1955-1964				1965-1974			
	Bangor		Roseto		Bangor		Roseto	
	Death Rate	No. of Deaths	Death Rate	No. of Deaths	Death Rate	No. of Deaths	Death Rate	No. of Deaths
Men								
35-44	5.3	2	8.3	1	4.0	1	33.3	3
45-54	32.6	14	9.8	1	57.0	20	55.0	6
55-64	117.3	36	29.0	2	95.2	34	92.8	9
65+	216.4	66	211.3	15	248.5	82	268.7	18
Women								
35-44	6.3	3	0		0		0	
45-54	6.6	3	0		0		0	
55-64	43.1	15	15.9	1	33.9	15	15.9	2
65+	140.7	57	120.0	9	146.3	73	181.8	16

TABLE 3—Standardized Mortality Ratios (SMR) of Roseto to Bangor and Confidence Intervals (CI), 1935 to 1984

	1935-1944		1945-1954		1955-1964		1965-1974		1975-1984	
	SMR	CI	SMR	CI	SMR	CI	SMR	CI	SMR	CI
Myocardial infarction										
Men	.58	(.41, 0.75*)	.66	(.52, 0.81*)	.66	(.52, 0.80*)	1.15	(.95, 1.34)	1.03	(.84, 1.22)
Women	.53	(.32, 0.74*)	.70	(.46, 0.93*)	.65	(.46, 0.84*)	1.07	(.78, 1.36)	1.06	(.78, 1.37*)
Congestive heart failure										
Men	.81	(.63, 1.00)	.84	(.61, 1.07)	.88	(.61, 1.15)	.85	(.61, 1.09)	.51	(.27, 0.75*)
Women	1.05	(.82, 1.29)	1.35	(.99, 1.72)	.79	(.54, 1.04)	1.11	(.76, 1.47)	.88	(.50, 1.25)
Myocardial infarction and congestive heart failure										
Men	.71	(.58, 0.84*)	.73	(.60, 0.85*)	.72	(.60, 0.84*)	1.06	(.90, 1.21)	.93	(.78, 1.09)
Women	.89	(.72, 1.06)	1.05	(.83, 1.26)	.71	(.56, 0.86*)	1.09	(.86, 1.31)	1.00	(.78, 1.23)
All causes										
Men	.77	(.69, 0.86*)	.86	(.76, 0.96*)	.80	(.71, 0.89*)	1.08	(.97, 1.19)	.78	(.69, 0.86*)
Women	.96	(.85, 1.06)	1.13	(.98, 1.27)	.79	(.68, 0.90*)	1.17	(1.01, 1.33*)	.76	(.64, 0.87*)

*Significant at confidence levels of 95%; under 1.0 the Roseto rate is lower.

sive rise over the 30-year period from 1935 to 1964. The rate for men in Bangor also rose during this time, while rates for Bangor women peaked in the period from 1955 to 1964. In the decade 1965 to 1974 there was a sharp increase in mortality from myocardial infarction among Roseto men and women. For women, the increase from the 1955 to 1964 decade was entirely in the 65 and older population, but for men it occurred in every age group and most dramatically in all 10-year age groups younger than 65 (see Table 2). In contrast, rates for congestive heart failure generally declined over the course of the five decades. Total mortality rates declined in both communities, although the drop is considerably greater for women than for men.

Table 3 shows the Roseto to Bangor ratios and confidence intervals of mortality rates for total deaths and for myocar-

dial infarction, congestive heart failure, and the two combined. The results indicate that the rates of death from all causes for men are significantly lower in Roseto for all decades except 1965 to 1974. For women they are significantly lower in 1955 to 1964 and 1975 to 1984 but significantly higher from 1965 to 1974.

Although there were no significant differences between the two communities in congestive heart failure until the last decade, the mortality rates for myocardial infarction in both men and women in Roseto were significantly lower than those for Bangor men and women over the initial period of thirty years. After 1965 this difference disappeared. When myocardial infarction and congestive heart failure are combined, Roseto men had a mortality advantage over Bangor men from 1935 until 1965.

Discussion and Conclusion

After a very thorough search of all sources of data for mortality in two small Pennsylvania communities over the course of 50 years, our examination of death certificates has confirmed the earlier inference, based on a shorter span of years, that the death rate from myocardial infarction was lower in Roseto than in immediately adjacent Bangor in three decades prior to 1965. The difference between the two communities is statistically significant despite the small number of myocardial infarctions. The sharp rise that followed involved mainly young Rosetan men and elderly women at a time when the predicted decrease in social cohesion became clearly manifest, as described in detail elsewhere.^{14,15} The increase in myocardial in-

farction in Roseto was accompanied by a similar increase in total mortality.

This remarkable pattern suggests systematic differences between the two neighboring communities over the course of at least 30 years—years for which there are many indicators of greater social solidarity and homogeneity in Roseto and no evidence of differences in coronary risk factors.¹⁵ The social changes that occurred in Roseto in the 1960s are reflected in sharply increased rates of heart attack among men under the age of 65. □

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References

1. Stout C, Morrow J, Brandt EN, Wolf S. Study of an Italian-American community in PA; unusually low incidence of death from myocardial infarction. *JAMA*. 1964;188:845.
2. Bruhn JG, Wolf S. *The Roseto Story: An Anatomy of Health*. Norman, Okla: University of Oklahoma Press; 1979.
3. Bruhn JG, Chandler B, Miller C, Wolf S. Social aspects of coronary heart disease in two adjacent ethnically different communities. *Am J Public Health*. 1966;56:1493-1506.
4. Lynn TN, Duncan R, Naughton J, et al. Prevalence of evidence of prior myocardial infarction, hypertension, diabetes and obesity in three neighboring communities in Pennsylvania. *Am J Med Sci*. 1967;254:385-391.
5. Bruhn JG, Phillips B, Wolf S. Social readjustment and illness patterns. Comparison between first, second and third generation Italian-Americans living in the same community. *J Psychosom Med*. 1972;16:387-394.
6. Kiritz S, Moos RH. Review article: physiological effects of social environments. *Psychosom Med*. 1974;36:96-114.
7. Lynch JJ. *The Broken Heart: The Medical Consequences of Loneliness*. New York, NY: Basic Books; 1979.
8. Spittle B, James B. Psychosocial factors and myocardial infarction. *Aust N Z J Psychiatry*. 1977;37:96-114.
9. Jenkins CD. Behavioral risk factors in coronary artery disease. *Heart Disease Behav*. 1978;29:543-562.
10. Rahe RH, Arthur RJ. Life change and illness studies: past history and future directions. *J Hum Stress*. 1978;4(1):3-15.
11. Thoreson RW, Ackerman M. Research review. Cardiac rehabilitation: basic principles and psychosocial factors. *Rehabil Counsel Bull*. 1981;24:223-255.
12. Schwab JJ. Stress from a psychiatric epidemiological perspective. *Stress Med*. 1986;2:211-220.
13. Wolf S, Grace K, Bruhn JG, Stout C. Roseto revisited: further data on the incidence of myocardial infarction in Roseto and neighboring Pennsylvania communities. *Trans Am Clin Climatol Assoc*. 1974;85:100-108.
14. Wolf S, Herrenkohl RC, Lasker J, Egolf B, Phillips B, Bruhn JG. Roseto, Pennsylvania 25 years later—highlights of a medical and sociological review. *Trans Am Clin Climatol Assoc*. 1988;100:57-67.
15. Wolf S, Bruhn JG. *The Power of Clan; A 25-Year Prospective Study of Roseto, Pennsylvania*. New Brunswick, NJ: Transaction Publishers; in press.
16. Dever GE, Champagne F. *Epidemiology in Health Services Management*. Rockville, Md: Aspen; 1984.
17. Census of population. Washington, DC: US Bureau of the Census; 1940, 1950, 1960, 1970, 1980.

APPENDIX—Bangor and Roseto Population Census by Age and Sex										
Age Group	1940		1950		1960		1970		1980	
	M	F	M	F	M	F	M	F	M	F
Bangor										
Under 35	1574	1628	1483	1559	1326	1330	1256	1214	1251	1175
35-44	383	394	478	520	380	477	252	285	208	240
45-54	345	374	383	386	430	458	351	438	215	281
55-64	263	272	291	349	307	348	357	443	298	384
65+	225	229	273	328	305	405	330	499	347	607
Total	2790	2897	2908	3142	2748	3018	2546	2879	2319	2687
Total of both sexes	5687		6050		5766		5425		5006	
Roseto										
Under 35	605	655	485	506	417	424	358	353	366	302
35-44	99	92	125	165	121	143	90	111	57	77
45-54	60	64	83	79	102	145	109	139	93	105
55-64	58	60	44	65	69	63	95	126	90	121
65+	45	40	67	57	71	75	67	88	105	168
Total	867	911	804	872	780	850	719	817	711	773
Total of both sexes	1778		1676		1630		1536		1484	