ROSETO REVISITED: FURTHER DATA ON THE INCIDENCE OF MYOCARDIAL INFARCTION IN ROSETO AND NEIGHBORING PENNSYLVANIA COMMUNITIES

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In an earlier study, covering a seven-year period from 1955 through 1961, a remarkably low incidence of death due to myocardial infarction was discovered in an all-Italian community, Roseto, in eastern Pennsylvania.[1] In fact, coronary deaths in Roseto numbered fewer than half of those in the surrounding towns, Nazareth, Bangor, Stroudsburg and East Stroudsburg, where death rates approximated the national figures for myocardial infarction. The remarkably low death rate from myocardial infarction in the Italian community was most striking among the younger men, there having been, over the seven-year period of study, no coronary deaths below age 47. The validity of the interpretation of the findings was challenged[2, 3] and defended.[4]

The original studies of Roseto and surrounding communities were subsequently supplemented by a thorough examination and testing of the populations.[5] History, physical examination and EKG failed to reveal stigmata of ischemic heart disease among Rosetans under age 55, while such evidence was common among the other populations, including the relatives of Rosetans who lived elsewhere in eastern Pennsylvania, New Jersey or New York. Moreover, several deaths from myocardial infarction below age 45 were documented among those Italians who were born in Roseto but lived most of their lives in other communities. Fat intake, obesity, cigarette smoking and serum cholesterol concentration did not differ significantly among the towns studied. It was concluded, therefore, that the relatively low incidence of death from myocardial infarction in Roseto could not be explained by dietary, ethnic or genetic factors.

The distinct feature of Roseto was its remarkably closely knit social pattern. Unlike inhabitants of most American towns, Rosetans were found to be cohesive and mutually supportive, with strong family and community ties.[6] The men in Roseto appeared to be the unchallenged heads of their households. The elderly were revered and, unlike most oldsters in

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America, they retained their influence on family affairs. Problems were customarily solved in family conclaves where each person took responsibility and often made some sacrifice. Less intimate, but nevertheless very close, were ties to neighbors and others in the community. There was great civic pride. Roseto held an enviable record of always "going over the top" in community drives and in providing prompt financial assistance to flood-torn or other disaster areas around the world, especially in Italy. The overall atmosphere of the town was one of mutual support and understanding, and unfailing sustenance in time of trouble.

Changing Philosophy Among the Young

In the initial examinations of Rosetans, carried out in 1962 and 1963, the younger Italian men whose grandfathers or great-grandfathers had immigrated to Roseto gave evidence of only a halfhearted commitment to the prevailing old world philosophy of family and community solidarity. They had been spared the experience of their relatives a generation older who had had to bear social discrimination at the hands of their Anglo-Saxon neighbors. Discrimination against Italians was no longer practiced. In fact, by now, Rosetans had achieved a degree of economic success that made them an object of admiration and even envy in the eyes of their neighbors. In the course of our sociologic interviews, most men under 35 years of age expressed conventional American attitudes and betrayed little interest in the old world values and standards. In 1965, a more thorough sociological survey was conducted by Dr. John Bruhn in which 86% of the adult inhabitants were interviewed in their homes.[7] It was not surprising that by this time substantial changes in the prevailing mores of Roseto were occurring. In view of these social changes we predicted that the relative immunity from early death from myocardial infarction would soon be lost. A subsequent intensive follow-up study of eighteen family units, made in 1972, confirmed the accelerating pace of acculturation and elicited sharply contrasting responses from representatives of three generations to social change in the community.[8] The formerly tight cohesive social structure was noticeably looser. Several young men had married non-Italians. The attendance at the men's clubs had fallen off, and Rosetans were beginning to join country clubs. Local church attendance had declined, too, and Rosetans were beginning to attend churches in other communities.

The present study of mortality statistics from 1962 through 1970 was undertaken to strengthen the initial findings and to test the current trend by adding nine years to the original mortality data from two of the communities, Roseto and Bangor, and four years to the data on predominantly German Nazareth. The people of Bangor, originally of English and

Welsh descent, are now mixed with those of German, Italian and other ethnic backgrounds. Roseto's population is still 95 per cent Italian. Most inhabitants are descendants of families who immigrated in 1882 from Roseto, Valfortore, Italy.

Methods

Like those from the earlier published study,[1] the data were gathered initially from death certificates.* All cardiac and cardiopulmonary diagnoses were screened as well as other sudden deaths, whether they occurred near home or away from home. The information was then supplemented by a review of hospital records with particular attention to EKG tracing, histories and autopsy findings. The autopsy data were of little value because of the small number of autopsies. When possible, further supplementation was achieved by tracing the patients' records to the offices of their physicians. For the period 1966 through 1970, mortality data were gathered for Roseto and Bangor only. A local Italian physician, who was well acquainted with the inhabitants of both communities, supplied detailed clinical information on each death as it occurred in his own patients as well as in patients of other neighborhood physicians. In addition he supplied a description of the social and familial circumstances prior to and at the time of each death. Other local physicians also supplied supplementary information.

In order to avoid, if possible, overlooking any "coronary" death, records reporting all cardiac conditions, including rheumatic and congenital heart disease, chronic obstructive pulmonary disease, hypertensive heart disease and others, were given careful study. All cardiac deaths were then divided into three major categories: 1) death from myocardial infarction, proven anatomically, established clinically or presumed on the basis of previous history and circumstances of death; 2) deaths from arteriosclerotic heart disease without evidence of myocardial infarction; 3) deaths from hypertensive heart disease, congenital and rheumatic heart disease, and instances in which the evidence favored emphysema or pneumonia rather than any form of heart disease.

Results

Table I indicates the percentage of population at risk in each age group and compares the rate of myocardial infarction in the initial survey with that of the current survey of the three Pennsylvania communities for 1955 through 1961 and 1962 through 1965, and for 1966 through 1970 for

* Obtained with the kind assistance of Mr. William R. Dixon, Director, Division of Data Processing, Pennsylvania Department of Health.

TABLE I

Population	Age	1950 Census		1960 Census		1970 Census		Total Deaths From Myocardial Infarction						Rate/100,000 per Year From Myocardial Infarction					
								1955–61		1962–65		1966–70		1955–61		1962–65		1966–70	
		M%	F%	M%	F%	M%	F%	M	F	M	F	M	F	M	F	M	F	M	F
	25–34	9.37	10.20	6.69	7.24	6.63	7.15	—	—	—	—	—	—	—	—	—	—	—	—
Roseto	35–44	7.46	9.84	7.42	8.77	7.48	8.84	—	—	—	—	—	—	—	—	—	—	—	—
	45–54	4.95	4.71	6.26	8.90	6.31	8.97	1	—	—	—	1	—	139	—	—	—	204	—
1950–1676	55–64	2.62	3.88	4.23	3.86	4.68	4.36	—	—	1	2	2	—	—	—	357	781	556	—
1960–1630	<65	24.40	28.63	24.60	28.77	25.10	29.32	1	—	1	2	3	—	38	—	96	210	205	—
1970–1538	>65	4.00	3.40	4.36	4.60	4.42	4.68	4	4	6	4	11	8	794	752	2143	1351	3235	2222
	Total of >25	28.4	32.03	28.96	33.37	29.52	34.00	5	4	7	6	14	8	182	184	484	489	779	543
	25–34	7.45	8.71	5.08	5.60	4.81	5.16	—	—	—	—	1	—	—	—	—	—	76	—
Bangor	35–44	7.90	8.60	6.59	8.27	4.64	5.25	1	2	3	—	—	—	35	55	224	—	—	—
	45–54	6.33	6.38	7.46	7.94	6.47	8.07	9	2	7	3	11	—	288	62	435	166	606	—
1950–6050	55–64	4.81	5.77	5.32	6.04	6.58	8.16	23	9	10	4	14	5	1106	391	1111	262	800	233
1960–5766	<65	26.49	29.46	24.45	27.85	22.50	26.64	33	13	20	7	26	5	385	135	471	116	397	63
1970–5425	>65	4.51	5.42	5.29	7.02	6.08	9.20	40	40	27	28	38	27	1905	1480	2150	1598	2332	1113
	Total of >25	31.00	34.88	29.74	34.87	28.58	35.84	73	53	47	35	64	32	666	465	783	481	747	320
	25–34	7.38	8.37	6.44	6.52	5.14	5.18	—	—	—	—	/	/	—	—	—	—	/	/
Nazareth	35–44	7.27	7.65	6.54	7.31	5.83	6.21	—	—	2	1	/	/	—	—	131	59	/	/
	45–54	5.76	6.30	6.60	7.09	6.02	7.19	7	1	5	4	/	/	237	32	321	231	/	/
1950–5830	55–64	4.42	5.32	4.94	5.88	5.66	6.90	22	6	19	2	/	/	1037	239	1508	132	/	/
1960–6209	<65	24.83	27.64	24.52	26.80	22.65	25.48	29	7	26	7	/	/	344	73	525	113	/	/
1970–5815	>65	4.65	5.70	5.06	6.22	5.02	8.98	56	35	31	15	/	/	2516	1393	2533	864	/	/
	Total of >25	29.48	33.34	29.58	33.02	27.67	34.46	85	42	57	22	/	/	750	396	896	300	/	/

Bangor and Roseto only. Table II illustrates the distributions of other cardiac deaths.

For the years 1955 through 1961, the death rate from myocardial infarction in Roseto among men under age 65 was a small fraction of that in the other two communities. In the 1962 through 1965 survey the Roseto rate had apparently risen to about 20% of that in the other two communities, with no deaths in Roseto below age 55, whereas in Bangor and Nazareth coronary deaths in the fourth and fifth decades were recorded.

By 1970 the death rate from myocardial infarction had clearly risen, the rate for Rosetan males under age 65 having reached nearly ⅔rds that of neighboring Bangor. Although the age distribution of the population at risk had not changed significantly, both males and females in Roseto were dying at more than twice the rate recorded in the original seven year study sample covering 1955 through 1961. Because the numbers are small, statistical significance cannot be attached to the apparent increasing

TABLE II

	1955–1961 (1958)			1962–1965 (1963.5)			1966–1970 (1968)		
	ASHD	HCVD, RF & CONG	Pulmonary	ASHD	HCVD, RF & CONG	Pulmonary	ASHD	HCVD, RF & CONG	Pulmonary
Roseto									
M	210.5	0	149.4	214.5	53.6	107.2	350.1	0	131.2
F	102.1	25.5	51.0	93.1	0	46.5	152.3	76.1	152.3
Bangor									
M	208.8	8.0	177.3	353.0	32.0	96.2	380.7	76.1	50.7
F	244.5	26.6	216.4	276.6	12.5	113.1	358.0	30.6	40.9
Nazareth									
M	251.8	45.6	143.9	298.6	71.1	85.3			
F	280.0	40.7	97.0	270.4	73.7	122.9			

death rate from myocardial infarction in Roseto. The differences between Roseto and the other two neighboring communities, however, are highly significant. Comparing coronary deaths below age 65 over the entire sixteen year period in Roseto and Bangor yields a highly significant $p < 0.001$.

Although insufficient time has passed for any firm inference regarding the apparently rising death rate from myocardial infarction in Roseto, it is tempting to speculate that it may reflect the changing social philosophy and practices. During the first six months of 1971, while the 1970 survey was being made, two men in the age group 35 to 44 died of well-documented myocardial infarction. They were the first deaths in Roseto in that age group in the more than sixteen years of study. Detailed data were gathered on both men. One had been a subject in the medical survey on two occasions, 1962 and 1965. Both of the young men had deviated widely from the cultural norm of Roseto, and both had been excluded to a considerable extent from the mainstream of community life.

Subject A was born in Roseto, the oldest of four children, three brothers and one sister. In addition, there were three half-brothers and five half-sisters from his mother's previous marriage. His father, a carpenter, had immigrated from Italy and died at age 72 of aplastic anemia. His mother, who had diabetes and hypertension, died at 64 of myocardial infarction.

Mr. A graduated from high school, worked as a carpenter, and at 25 he married a German girl 20 years old, also a high school graduate. He was Roman Catholic, and she converted to Catholicism. He described himself as a tense, nervous person who found it difficult to relax because "I feel I need to get things done and can't waste time."

Two years after the marriage Mr. A started his own construction business in a town about 20 miles away. He worked overtime and smoked three packages of

cigarettes a day for 20 years. Neither he nor his wife were members of social and civic organizations in Roseto. He had no close friends in Roseto. The marriage yielded four children. His wife resented the amount of time his work kept him from home. Her interest was in family life. His was in making money. His mother died when he was 28, "the most unhappy time in my life. I tried to lose myself in work." He said he had thought about moving away from Roseto "to get closer to my business."

At age 29, Mr. A was first hospitalized for chest pains when the construction business failed. After bankruptcy he founded a new company. This time the business succeeded financially and Mr. A "lived like a king." He traveled to Puerto Rico, Las Vegas, gambled at the races and bought expensive cars. He spent about $1,000 weekly, gave wrist watches to the children of his relatives and responded generously to others who asked him for money or gifts without concern for repayment. He kept the problems of running the company to himself. His friend said "you would never dream he had pressure on him unless you knew him. He always had it tough, but managed to get out of it." He enjoyed risk-taking. Two months prior to his fatal heart attack, during a trip to Puerto Rico, he lost $9,000 in one night gambling.

He was hospitalized in the intensive care unit for chest pains following his discovery that a bonding company had issued a fake bond in connection with a large contract. Upon being told that his EKG was normal, he signed himself out of the hospital against medical advice, and engaged in a poker game until the early hours of the morning. During the two weeks following his hospitalization, he made ten business trips to adjoining towns in addition to finally reconciling the bonding problem. The day of his death, he engaged in a fist fight with a drunk, was arrested and required to post $1,000 bail in cash. Later that day he attended the wake of a friend in a nearby city and, upon returning home, collapsed and died suddenly at age 39.

Subject B was born in Philipsburg, New Jersey, the eighth of ten children (six boys and four girls). Nine siblings are living. His father, a laborer born in Sicily, died at 49 of myocardial infarction. Dating from the death of her husband, his mother had paroxysmal auricular tachycardia, but lived until age 78.

Mr. B. graduated from high school but could not afford college. He married at age 24 to a Rosetan girl three years younger than he, and moved to Roseto. They had two children, one son and one daughter. He worked at the same job as a clerk typist for 22 years, typing 100 words per minute with two to four fingers. He did his job well, but begrudged the fact that he did not have a college education. He got on very poorly with his wife, who kept him in debt by continually buying gifts for her relatives and expensive clothes for herself and their daughter. He tried to make up for the financial drain by working overtime.

He had a long history of financial and marital trouble. According to a brother, "His whole life was under stress. His wife would harp at him like an old shrew. If he would have had a happy home life he would have been happy living in Roseto."

He was not a member of any social or civic organizations in Roseto and had no close friends. He said in an interview, five years before his death, "I don't fit in the town—I don't live like *they* do—I'm not like the Rosetans." When asked, in the same interview, whether he had been able to do what he wanted in life, he said "No, I don't think I've accomplished it. That's why I'm nervous." He stuttered when under stress, smoked two packages of cigarettes and drank about twenty cups of coffee a day.

During the two months prior to his death, in addition to working overtime on his

job, he was paneling a room at home at night and on weekends. For several days he also did the washing and ironing while his wife was recovering from an operation on her foot. Two days prior to his death, while paneling without help or without power tools, he developed chest pains. The following day, while driving to work, the chest pains became worse and he began sweating profusely and experiencing numbness in his arms. He went to a hospital, but was released without treatment or an EKG. He drove home to see his own doctor, where he collapsed and died.

Both case histories offer striking contrast to the usual pattern of life prevailing in Roseto, as previously reported.[6] Whether or not, as the first deaths from myocardial infarction in Rosetans below age 47 in 16 years, they reflect a breakdown of the formerly cohesive old world community structure cannot be stated as yet. Further followup study will be required to confirm or deny the prediction that the Rosetan's relative immunity from coronary deaths in the first six decades of life will fade as their idiosyncratic way of life comes to an end.

Death rates from cardiovascular disorders other than myocardial infarction did not differ significantly among the three towns over the period of study. This was even true of arteriosclerotic heart disease with congestive heart failure, death occurring mainly among men and women over age 65 (Table II).

Summary and Conclusions

The present study, taken together with the original research on the incidence of death from myocardial infarction in eastern Pennsylvania communities[1] yields data covering a period of sixteen years. While conventional risk factors: consumption of animal fat, lack of exercise, obesity and cigarette smoking are no less in Roseto than in nearby communities, Roseto continues to experience a significantly lower death rate from myocardial infarction than that of neighboring communities, particularly among those below the age of sixty-five. Associated with a noticeable weakening of the cohesive social structure since 1965, however, and in keeping with earlier predictions based on observation of the changing ways of life in Roseto, the discrepancy between Roseto and its neighbors with respect to coronary death rate is becoming less, and men below the age of 45 have begun to die of myocardial infarction. These findings reinforce the earlier suggestion that the quality of family relationships and the social milieu may be pertinent to the occurrence of or protection against death from myocardial infarction.

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DISCUSSION

DR. HERBERT LANGFORD (Jackson): I have sat in around committees with Stamler, Remington and other people that you know, and of course they are terribly impressed that the overwhelming factor in the final death from myocardial infarction is the cigarette smoking rate. Are you implying there is no difference in cigarette smoking frequency, no matter how you express it, from your neighboring towns?

If you do look at electrocardiographic changes in the surviving ones, if you find any difference in electrocardiographic evidence of previous myocardial infarction, and if you break down myocardial infarction rates into diagnosed myocardial infarction versus sudden death, do you get any kind of pattern.

DR. WOLF: The question of smoking—the number of people who smoke in Roseto is essentially identical to that in the neighboring communities. It is true, however, that the number of cigarettes that smokers smoke is somewhat higher in the other communities than it is in Roseto. The difference is not striking, but there is a difference. With respect to the electrocardiographic examination, we've examined about three quarters of the population of Roseto over the age of twenty-five repeatedly and have compared the findings with those in the immediate neighboring town of Bangor. There were no stigmata of coronary disease among Rosetans under the age of fifty-five; whereas, in the other communities, there was the usual profusion of stigmata among those in their thirties and forties. The town of Roseto is relatively small—a population of about 1600. We now have data, however, extending over sixteen years, thereby extending the numbers base to more than 25,000. I think the original skepticism based on small numbers has now been pretty well disposed of.

DR. LEWIS DEXTER (Boston): Stu, this is fascinating, but there are a couple of questions I would like to ask. In this population, what about the really major risk factors of hypertension and diabetes. You've mentioned family history, but what about the diabetes and the hypertension in that community?

DR. WOLF: Hypertension is a little hard to be sure about because our data concerns spot examinations of these individuals, and I can't be confident about that. Casual blood pressures, however, were higher among Rosetans than their neighbors.

We have good data on the diabetes. The age adjusted prevalence among Rosetans was 26 per thousand among men and 37 per thousand among women. The figures for Nazareth were 44 and 30 for men and women respectively.

DR. RICHARD FRANCE (Nashville): Stewart, was there any evidence that social pattern and the incidence of myocardial infarction bore any relationship to serum cholesterol in your study?

DR. WOLF: We compared the serum cholesterol concentrations in this community to that reported in the Framingham study and their age-by-age values were almost identical. Thus the serum cholesterol picture is not different in Roseto from the other communities.

DR. JAMES W. HAVILAND (Seattle): Stewart, when and of what did the good guys die of in the old days?

DR. WOLF: The largest number of deaths was from strokes, and as I said hypertension was apparently common, but because we have only spot observations on blood pressure I can't be certain about the hypertension story. An unique feature about Roseto's population that I should have mentioned is that there are a few more widowers than widows.