*A community study of coronary heart disease was carried out in Bangor, Pa., and the death rate from myocardial infarction found to be higher than in an ethnically different neighboring community. When group comparisons were made on patients and questionables in the two communities, no significant variables emerged. Stability of community was found related to a lower incidence of death from myocardial infarction.*

# SOCIAL ASPECTS OF CORONARY HEART DISEASE IN TWO ADJACENT, ETHNICALLY DIFFERENT COMMUNITIES

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OBSERVATIONS regarding the incidence of coronary heart disease have been made in numerous different cultural groups throughout the world. Schwartz, et al.,[1] found myocardial infarction and ischemia rare among the South African Bantu. Cosnett[2] has made similar observations among the African Zulu. Christakis, et al.,[3] report a low incidence of coronary heart disease among men on the island of Crete. Toor, et al.,[4] report that Near Eastern Jews who immigrated to Israel have a lower incidence of coronary heart disease than European Jews who are nonmigrants. Dreyfuss, et al.,[5] found a low incidence of coronary heart disease among Jews who immigrated to Israel from the Atlas Mountain region of North Africa. Jervell, et al.,[6] found that the mortality rate from coronary heart disease in seven small rural towns in Norway was about half that in Oslo. White and Toomey[7] noted a low incidence of coronary heart disease among the isolated Hunzas living in the Himalayas. Mann, et al.,[8] report a low incidence of coronary heart disease among the pastoral Masai in Tanganyika. Gsell and Mayer[9] found that residents of a Swiss Alpine village had low serum cholesterol levels, despite a diet high in fat and caloric content, compared to a working class group of similar cultural origin in the city of Basel. These researchers state that this finding could not be explained by differences in weight, adiposity, altitude and climate, serum magnesium, or smoking habits. Groen, et al.,[10] studied coronary heart disease among the Trappist and Benedictine monks in Belgium and Holland who live a way of life which differs from that of modern Western civilization. These investigators concluded that although there was a marked difference in nutrition and blood cholesterol between the groups, the groups did not differ in the frequency of myocardial infarction or of diffuse ischemic heart disease.

Lower incidence and prevalence rates of coronary heart disease have been reported among geographically isolated

or culturally uniform groups in the United States compared to the rates for the US population. Deuschle and Adair[11] found an incidence of coronary heart disease among the Navajo Indians of 8.0 per 1,000 compared to 32.9 per 1,000 in the Framingham, Mass., study. Gilbert[12] noted the virtual absence of coronary thrombosis among the Navajos; and Streeper, et al.,[13] also reported a low incidence of coronary heart disease. Clifford, et al.,[14] found that coronary heart disease was rare in a White Mountain Apache tribe. Epstein, et al.,[15] found that Jewish clothing workers in New York City had a prevalence of coronary heart disease twice as high as that for Italian clothing workers. Stout, et al.,[16] found that Roseto, an Italian-American community in Pennsylvania, had a death rate from myocardial infarctions one-half that of four neighboring non-Italian communities.

Social and cultural factors have been found to be important variables associated with such diseases as mental illness and tuberculosis and, as seen from the previous literature review, these factors are felt by some researchers to be associated with differing rates of coronary heart disease in different cultural groups. Pursuing the initial findings of Stout, et al., a sociological study of Roseto was undertaken to determine factors that might be related to the low death rate. It was found that Roseto is culturally unique in the common history and ancestry of its inhabitants, its traditions, customs, dietary habits, its closely-knit community social structure and family units and in the retention of its ethnic uniformity, despite the fact that it is surrounded by non-Italian communities which exert pressures upon it to conform to the way of life of the larger American society (Bruhn[17]).

In order to examine the ways in which Roseto might differ culturally from a small, American community, a sociological study of Roseto's adjacent neighbor, Bangor, was undertaken and is the focus of the present study. Specifically, the purposes of this paper are to: (1) briefly describe the social structure of Bangor, (2) report sociological data from subjects participating in a clinical study of myocardial infarctions in Bangor, (3) compare the Roseto and Bangor subjects who showed clinical evidence of a myocardial infarction, and (4) compare the social structures of Roseto and Bangor.

## Social Structure of Bangor

Bangor is located in east-central Pennsylvania in the heart of the Slate Belt, immediately adjacent to Roseto. The earliest immigrants to this locality in the eighteenth century were mostly Germans who were followed by the English, Welsh, and Italians. Bangor was primarily agricultural until 1855 when slate was discovered in the local hills. With the subsequent building of the Bangor and Portland railroad in 1878, Bangor became an industrial center.

Today, Bangor is a community of 5,766 persons. In the past the slate quarries provided the base of the economy. However, the economy today is dependent upon a large textile factory and about 15 shirt and blouse factories located within the community which mainly employ women. The males are required to seek employment in cement, steel, and other industries in nearby towns. The total population has decreased 14 per cent since 1940. It is therefore a matter of concern to residents that Bangor may eventually become a "bedroom town" in which people live, but work elsewhere.

Bangor is diverse ethnically. No distinctive cultural traditions or customs are practiced by the residents except for some Italians and Germans who adhere to dietary habits characteristic of their culture. Ethnic diversity and historical rivalries between the Germans,

English, Welsh, and Italians complicate community cohesiveness. As one individual stated "We have to sell something four times instead of one." However, ethnic rivalries are lessening somewhat, and interethnic marriages are becoming more frequent. Although ethnic feelings are less overt than formerly, they are part of the way of life in Bangor and have kept it an ethnically segmented community.

The Bangor borough consists of only one and one-half square miles, but acts as a business, religious, and social center for people who live within a radius of five miles. There are eight Protestant churches, one Catholic church, and numerous social, fraternal, political and religious organizations, which are representative of those found in other small American communities.

Religious leaders in Bangor generally pointed out that people from different socioeconomic and ethnic backgrounds belonged to their churches, but few seemed involved in the social affairs of the church, or had a commitment to religious activities. Most religious leaders reported active participation of 50 per cent or less of their congregations in Sunday services.

The mayor of the community is the political figurehead; and four individuals are frequently mentioned as the community leaders, none of whom are distinctive either by wealth or education. Several of the leaders said that Bangor "had lost its spark; we have no go-getters. People pull for themselves here." Several civic organizations have disbanded because of the lack of community involvement and a lack of interest among the young people (Community Chest, Visiting Nurses Association and Kiwanis Club). The 30 to 50 "wealthy" families in the Bangor borough were characterized as "the older type, who are aloof, are not leaders, and do not carry the town."

Educationally and occupationally Bangor might be classified as a lower middle class American community. The average yearly income for most families ranges between $4,000 and $9,000, which is usually contributed to by both husband and wife. Some residents feel that Bangor is not progressive and stated, "Here there is an over-abundance of people who are satisfied with the status quo. They are content to live here. They lack the courage to try a new environment and go on year after year in this environment." Other Bangorians, however, are satisfied with the small town atmosphere.

## Methods

In the summer of 1964 a group of Oklahoma Medical School investigators established a community clinic in Bangor. The clinic was publicized through the mass media as a health clinic offering free physical and laboratory examinations to all Bangorians over age 21; and it was known that the purpose of the study was to screen the general population for clinical evidence of coronary heart disease. A total of 1,408 individuals (623 males and 785 females) were examined in the clinic.

### Diagnostic Criteria

The criteria used for the ECG diagnosis of prior myocardial infarction are those listed in "Epidemiology of Cardiovascular Diseases Methodology, Hypertension and Arteriosclerosis." QRS Criteria Type II were used, except that no "definite" infarctions were read on the basis of a Q of less than 0.04 seconds in duration and posterior infarction was read on the basis of a slurred R in lead V-1 with a duration of greater than 0.04 seconds in the absence of R V H. An electrocardiogram was read as "questionable" if it failed to meet the above criteria by 0.01 second or less, or by 1 mm or less.[18] The elec-

trocardiograms were read without a knowledge of the individual's social history.

### Subjects

The sociological sample consisted of 984 individuals, 437 males and 547 females. An attempt was made to interview all of the people examined in the clinic; however, during sporadic busy periods individuals were randomly selected to be included in the sociological sample. The cardiologists determined the classification of the subjects. There were 36 patients (23 males and 13 females), there were 36 individuals classified as "questionables" (24 males and 12 females), and 912 controls (390 males and 522 females). All subjects in the sample were Caucasian.

### The Interview and Determination of Social Variables

Comprehensive sociological interviews of approximately 45 minutes duration were administered by five sociologists. At the time of the interview the subject's diagnosis was unknown. Objective information was obtained related to the individual, his parents, siblings, and his present family, i.e., age, sex, ethnic identification, education and occupation, and also information regarding the subject's occupational history, present annual gross income and peak income, organizational membership, smoking history, and potential areas of stress related to his occupation, family, and financial status.

Using the subject's education and occupation, his social class was computed using Hollingshead's Index of Social Position.[19] Educational and occupational mobility were assessed by comparing the subject's education and occupation with that of his or her father. Thus, we could determine whether the individual was upwardly mobile, downwardly mobile, or stable in these two areas compared to the educational and occupational achievements of his or her parental family. The degree of the subject's geographical mobility was determined by the number of moves made between towns in the last ten years. Job continuity was assessed by the total number of changes in employer or type of work in the occupational history of the subjects. Also, the subjects were asked whether they considered themselves a tense and worrying type of person. Because of the varying meanings of these terms to different people, we used only the subject's "yes" or "no" response to this question.

### Bangor and Roseto Patient Comparisons

The same interview described above was used previously in Roseto and was the basis for determining the social variables studied. In addition the same diagnostic criteria were employed in the classification of the Roseto patient group. Both the Roseto patients and Bangor patients were individually matched with controls on sex and age. Comparisons were then made between the Roseto patients and their matched controls and the Bangor patients and their matched controls.

## Results

### Characteristics of the Total Bangor Sample

Table 1 shows that the Bangor sample is representative of the adult population of Bangor by sex and generally representative by age, except the sample is over-representative of males and females in the age group 45-54 and slightly under-representative of both sexes aged 25-34.

Of the total subjects in the sample, 75 per cent were married, 10 per cent had been married more than once, 2 per cent were divorced or separated, 5 per cent were single, and 8 per cent were widowed. Eighty-four per cent were Protestant, 13 per cent were Roman Catholic, 1 per cent belonged to other religious groups, and 2 per cent had no religious affiliation. Three per

cent were born outside the United States, 39 per cent were born in Bangor, and 58 per cent were born elsewhere in the United States. Those with definite and questionable evidence of a previous myocardial infarction, referred to in the tables as "patients" and "questionables," did not differ on marital status, religion, or place of birth from those free of evidence of a myocardial infarction, referred to in the tables as "controls."

Table 2 shows the subjects in the Bangor sociological sample by ethnic identification. The controls, patients, and questionables differed significantly by chi-square on ethnic identification ($p<0.01$). The patients differed from the questionables on this variable ($p<0.09$). The patients differed from the controls ($p<0.08$).

In Table 3 the subjects are shown by sex, age, education, and social class. It was found that there were significantly more males than females among the patients and questionables compared to the controls ($p<0.001$). Duncan's New Multiple Range Test[20] was used to test the differences between the controls, patients, and questionables on age; the controls were found to be significantly younger than the patients and questionables ($p<0.05$). The controls, patients, and questionables did not differ significantly on education when an analysis of covariance was performed with adjustments for sex and age. Significant differences were found between the controls, patients, and questionables on social class ($X^2=8.06$, 2 df, $p<0.02$). This difference was due to the greater proportion of questionables than patients and controls in the higher social classes and proportionally more patients than controls in the lower social classes.

Duncan's New Multiple Range Test was used to test the difference between the controls, patients and questionables on organizational membership and job continuity. There were no significant differences between the groups on either of these variables or on present income and peak income when an analysis of covariance with adjustments for age was carried out.

Since sex and age are related to the incidence of coronary heart disease it was predicted that several of the sociological variables would vary as a function of sex and age. It was therefore considered necessary to examine sex and age differences within the control sample before making any comparisons between the controls, patients, and questionables. The sex and age differences

**Table 1—Comparison of total Bangor population and sociological sample by sex and age**

| | Bangor Population* 1960 | | | | Bangor Sociological Sample 1964 (N=984) | | | |
|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Male | | Female | |
| | No. | % | No. | % | No. | % | No. | % |
| Age Group | 1,965 | 47 | 2,205 | 53 | 437 | 44 | 547 | 56 |
| 21-24 | 128 | 6 | 155 | 7 | 20 | 4 | 18 | 3 |
| 25-34 | 400 | 20 | 405 | 18 | 60 | 13 | 65 | 12 |
| 35-44 | 406 | 21 | 454 | 21 | 83 | 19 | 122 | 22 |
| 45-54 | 410 | 21 | 440 | 20 | 138 | 32 | 136 | 25 |
| 55-64 | 307 | 16 | 365 | 17 | 68 | 16 | 105 | 19 |
| 65+ | 314 | 16 | 386 | 17 | 68 | 16 | 101 | 19 |

* 1960 U. S. Census = 5,766. Since the study included only persons over age 21, the age group 21-24 above is an estimate of the census age group 15-24.

**Table 2—Subjects in Bangor sociological sample by ethnic identification**

| Ethnic Group* | Controls N= | Controls % | Patients N= | Patients % | Questionables N= | Questionables % | Total |
|---|---|---|---|---|---|---|---|
| English | 118 | 90.1 | 7 | 5.3 | 6 | 4.6 | 131 |
| Welsh | 50 | 90.9 | — | — | 5 | 9.1 | 55 |
| German | 358 | 92.3 | 18 | 4.6 | 12 | 3.1 | 388 |
| Combination of English, Welsh, German | 228 | 98.0 | 2 | 0.9 | 3 | 1.1 | 233 |
| Italian | 74 | 93.7 | 4 | 5.06 | 1 | 1.2 | 79 |
| Other (Czech., Polish, Austrian, Scotch-Irish, Lithuanian, French) | 84 | 85.7 | 5 | 5.1 | 9 | 9.2 | 98 |

* Controls, patients, and questionables differed significantly $X^2=25.36$, 10 df, $p<0.01$. Patients and controls differed $X^2=10.66$, 5 df, $p<0.08$. Patients and questionables differed $X^2=9.42$, 5 df, $p<0.10$.

were examined by means of chi-square.

Table 4 presents the frequency distribution of the total sample of males by diagnostic category and age, and Table 5 presents the same information for females on the following variables: Ethnic Identification, Geographical Mobility, Educational Mobility, Occupational Mobility, Present Smoking Status, and Self-Assessment of Tension.

### Sex Differences in the Bangor Control Group

Among the controls, males and females differed significantly from each other on Present Smoking Status in all age groups ($p<0.02$). Males and females also differed significantly from each other on Self-Assessment of Tension in all age groups ($p<0.001$) except in the 65 and over age group.

Since no significant male-female dif-

**Table 3—Subjects in Bangor sociological sample by sex, age, education, and social class**

| All Subjects (N=984) | Sex* M | Sex* F | Mean Age† M | Mean Age† F | Mean Years of Education M | Mean Years of Education F | Social Class[1]‡ (M and F) I-II-III | Social Class[1]‡ (M and F) IV-V |
|---|---|---|---|---|---|---|---|---|
| Controls (N=912) | 390 | 522 | 47.1 | 49.2 (48.3) | 11.2 | 10.9 (11.0) | 275 | 637 |
| Patients (N=36) | 23 | 13 | 60.8 | 66.8 (62.9) | 9.3 | 9.8 (9.6) | 6 | 30 |
| Questionables (N=36) | 24 | 12 | 62.9 | 62.8 (62.8) | 10.3 | 10.3 (10.2) | 17 | 19 |
| Totals | 437 | 547 | | | | | 298 | 686 |

[1] Social class was computed using Hollingshead's Index of Social Position based on the occupation and education of the head of the household. Social Class I-II-III="white collar"; social class IV-V="blue collar." The controls, patients, and questionables were significantly different on social class.

* $p<0.001$.
† $p<0.05$.
‡ $p<0.02$.

**Table 4—Frequency distribution of Bangor males in sociological sample by age groups (total N=437)***

| Variables | Age≤44† | | | Age 45-54 | | | | Age 55-64 | | | | Age 65 and Over | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cont. N=160 | % | Pat. N=1 | Cont. N=126 | % | Pat. N=9 | Quest. N=6 | Cont. N=57 | % | Pat. N=3 | Quest. N=8 | Cont. N=47 | % | Pat. N=10 | Quest. N=10 |
| Ethnic Identification | | | | | | | | | | | | | | | |
| English | 16 | 10.0 | – | 26 | 20.6 | 2 | – | 6 | 10.5 | – | 2 | 9 | 19.1 | 3 | 2 |
| Welsh | 10 | 6.2 | – | 6 | 4.8 | – | 1 | 5 | 8.8 | – | 1 | 4 | 8.5 | – | 2 |
| Pa. Dutch-German | 58 | 36.2 | 1 | 39 | 31.0 | 7 | 1 | 28 | 49.1 | 1 | 3 | 20 | 42.6 | 3 | 5 |
| Combination of above | 48 | 30.0 | – | 33 | 26.2 | – | 1 | 8 | 14.0 | 1 | 1 | 5 | 10.6 | – | – |
| Italian | 16 | 10.0 | – | 12 | 9.5 | – | 1 | 3 | 5.3 | 1 | – | 3 | 6.4 | 2 | – |
| Other | 12 | 7.5 | – | 10 | 7.9 | – | 2 | 7 | 12.3 | – | 1 | 6 | 12.8 | 2 | 1 |
| Geographical Mobility | | | | | | | | | | | | | | | |
| No moves | 109 | 68.1 | 1 | 113 | 89.7 | 7 | 4 | 51 | 89.5 | 3 | 6 | 40 | 85.1 | 7 | 7 |
| 1-2 moves | 39 | 24.4 | – | 13 | 10.3 | 2 | 2 | 5 | 8.8 | – | 1 | 7 | 14.9 | 3 | 3 |
| 3-4 moves | 10 | 6.2 | – | – | – | – | – | 1 | 1.7 | – | 1 | – | – | – | – |
| 4+ moves | 2 | 1.2 | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Educational Mobility | | | | | | | | | | | | | | | |
| Stable | 37 | 23.1 | – | 37 | 29.4 | 1 | 1 | 22 | 38.6 | 1 | 2 | 23 | 48.9 | 3 | 1 |
| Up | 115 | 71.9 | 1 | 85 | 67.4 | 8 | 2 | 33 | 57.9 | 2 | 3 | 21 | 44.7 | 4 | 7 |
| Down | 8 | 5.0 | – | 4 | 3.2 | – | – | 2 | 3.5 | – | – | 3 | 6.4 | – | – |
| Unknown | – | – | – | – | – | – | 3 | – | – | – | 3 | – | – | 3 | 2 |
| Occupational Mobility | | | | | | | | | | | | | | | |
| Stable | 66 | 41.2 | – | 50 | 39.7 | 3 | – | 20 | 35.1 | 2 | 2 | 20 | 42.6 | 4 | 4 |
| Up | 69 | 43.1 | 1 | 60 | 47.6 | 4 | 4 | 28 | 49.1 | – | 6 | 19 | 40.4 | 3 | 5 |
| Down | 25 | 15.6 | – | 16 | 12.7 | 2 | 2 | 9 | 15.8 | 1 | – | 8 | 17.0 | 3 | 1 |
| Smoking | | | | | | | | | | | | | | | |
| No | 60 | 37.5 | – | 55 | 43.6 | 4 | 3 | 31 | 54.3 | 2 | 4 | 20 | 42.6 | 5 | 7 |
| Less 1 pkg/day | 10 | 6.0 | – | 6 | 4.8 | – | 1 | 2 | 3.5 | – | 2 | 3 | 6.2 | 1 | – |
| More 1 pkg/day | 67 | 42.0 | 1 | 37 | 29.3 | 5 | – | 11 | 19.3 | – | 2 | 7 | 14.9 | 2 | 1 |
| Cigar and/or pipe | 23 | 14.4 | – | 28 | 22.2 | – | 2 | 13 | 22.8 | 1 | – | 17 | 36.2 | 2 | 2 |
| Self-Assessment of Tension | | | | | | | | | | | | | | | |
| Yes | 86 | 53.8 | 1 | 66 | 52.4 | 7 | 6 | 25 | 43.8 | 3 | 4 | 28 | 59.6 | 5 | 5 |
| No | 74 | 46.2 | – | 60 | 47.6 | 2 | – | 32 | 56.1 | – | 4 | 19 | 40.4 | 5 | 5 |

* Percentages are indicated for the control group only.
† There were no questionables in the under 44 age group.

**Table 5—Frequency distribution of Bangor females in sociological sample by age groups (total N=547)**

| Variables | Age≤44* | | Age 45-54 | | | | Age 55-64 | | | | Age 65 and Over | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cont. N=203 | % | Cont. N=130 | % | Pat. N=2 | Quest. N=4 | Cont. N=103 | % | Pat. N=1 | Quest. N=1 | Cont. N=86 | % | Pat. N=10 | Quest. N=7 |
| Ethnic Identification | | | | | | | | | | | | | | |
| English | 24 | 11.8 | 13 | 10.0 | – | – | 15 | 14.6 | – | – | 9 | 10.5 | 2 | 2 |
| Welsh | 5 | 2.5 | 7 | 5.4 | – | – | 7 | 6.8 | – | – | 6 | 7.0 | – | 1 |
| Pa. Dutch-German | 69 | 34.0 | 48 | 37.0 | 1 | 1 | 43 | 41.7 | – | – | 53 | 61.6 | 5 | 2 |
| Combination of above | 69 | 34.0 | 30 | 23.0 | – | 1 | 27 | 26.2 | 1 | – | 8 | 9.3 | – | – |
| Italian | 19 | 9.3 | 17 | 13.0 | 1 | – | 1 | 0.9 | – | – | 4 | 3.5 | – | – |
| Other | 17 | 8.4 | 15 | 11.5 | – | 2 | 10 | 9.7 | – | 1 | 7 | 8.1 | 3 | 2 |
| Geographical Mobility | | | | | | | | | | | | | | |
| No moves | 141 | 69.4 | 120 | 92.3 | 1 | 1 | 94 | 91.3 | 1 | 1 | 75 | 87.2 | 6 | 5 |
| 1-2 moves | 49 | 24.1 | 8 | 6.2 | 1 | 2 | 9 | 8.7 | – | – | 6 | 7.0 | 4 | 2 |
| 3-4 moves | 9 | 4.4 | 1 | 0.7 | – | – | – | – | – | – | 2 | 2.3 | – | – |
| 4+ moves | 4 | 2.0 | 1 | 0.7 | – | – | – | – | – | – | 2 | 2.3 | – | – |
| Unknown | – | – | – | – | – | – | – | – | – | – | 1 | 1.2 | – | – |
| Educational Mobility | | | | | | | | | | | | | | |
| Stable | 26 | 12.8 | 39 | 30.0 | – | – | 38 | 36.9 | – | – | 39 | 45.3 | 2 | 1 |
| Up | 137 | 67.5 | 77 | 59.2 | 2 | 2 | 50 | 48.5 | 1 | – | 43 | 50.0 | 5 | 4 |
| Down | 15 | 7.4 | 14 | 10.8 | – | – | 7 | 6.8 | – | – | 4 | 4.6 | 2 | – |
| Unknown | 25 | 12.3 | – | – | – | 2 | 8 | 7.8 | – | 1 | – | – | 1 | 2 |
| Occupational Mobility | | | | | | | | | | | | | | |
| Stable | 67 | 33.0 | 48 | 36.9 | 1 | 1 | 47 | 45.6 | – | – | 30 | 34.9 | 7 | 1 |
| Up | 90 | 44.3 | 60 | 46.2 | – | 3 | 38 | 36.9 | – | 1 | 33 | 38.4 | 3 | 4 |
| Down | 37 | 18.2 | 22 | 16.9 | 1 | – | 18 | 17.5 | – | – | 23 | 26.7 | – | 2 |
| Unknown | 9 | 4.4 | – | – | – | – | – | – | – | – | – | – | – | – |
| Smoking | | | | | | | | | | | | | | |
| No | 136 | 67.0 | 91 | 70.0 | – | 2 | 81 | 78.6 | 1 | – | 81 | 94.2 | 8 | 6 |
| Less 1 pkg/day | 31 | 15.3 | 17 | 13.0 | – | 1 | 14 | 13.6 | – | – | 5 | 5.8 | 1 | – |
| More 1 pkg/day | 36 | 17.7 | 22 | 16.9 | 2 | 1 | 8 | 7.8 | – | 1 | – | – | 1 | 1 |
| Cigar and/or pipe | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Self-Assessment of Tension | | | | | | | | | | | | | | |
| Yes | 153 | 75.3 | 98 | 75.4 | 2 | 4 | 79 | 76.6 | 1 | – | 58 | 67.5 | 5 | 5 |
| No | 50 | 24.6 | 32 | 24.6 | – | – | 24 | 23.3 | – | 1 | 28 | 32.5 | 5 | 2 |

* There were no patients or questionables in the 44 and under age group.

ferences were found in the control group on the other variables, e.g., ethnic identification, geographical, educational, and occupational mobility, the sexes were combined, and age group comparisons were made among the controls on these same variables. The sexes were not combined for age comparisons on Present Smoking Status and Self-Assessment of Tension, since significant sex differences were found on these two variables.

### Age Differences in the Bangor Control Group

Below are the findings when the age groups were compared among the controls, irrespective of sex, on ethnic identification, geographical, educational and occupational mobility.

1. Ethnic Identification

   Significant differences were found on ethnic identification in the following four age group comparisons ($p<0.02$): (1) the 44 and under age group differed significantly from the 55-64 age group and the 45-54 age group differed significantly from the 55-64 age group. These differences are probably due to the paucity of older Italians who participated in the Bangor study, (2) the 44 and under age group and the 45-54 age group differed significantly from the 65 and over age group. This may be attributed to the greater proportion of Germans in the 65 and over age group and a greater proportion of younger subjects of mixed ethnic backgrounds. Generally it was found that with increasing age there were fewer subjects of mixed ethnic backgrounds; this is presumably due to the fact that mixed marriages have been occurring only in recent years.

2. Geographical Mobility

   It was found that the 44 and under age group differed significantly from the 45-54, 55-64, and 65 and over age groups on this variable ($p<0.001$). The 44 and under age group had a larger proportion of people making three to four moves between towns compared to the other age groups. There were very few subjects who made more than four moves.

3. Educational Mobility

   The 44 and under age group differed significantly from the 45-54, 55-64, and 65 and over age groups on this variable ($p<0.001$). The 45-54 age group also differed significantly from the 65 and over age group ($p<0.01$). Only 5 per cent to 7 per cent of the subjects in all age groups were downwardly mobile, hence the significant differences were between the upwardly mobile and stable categories when age was considered. The greatest proportion of subjects were educationally upwardly mobile from their parents; this was notable especially in the younger age groups.

4. Occupational Mobility

   There were no significant differences between the age groups on this variable.

5. Present Smoking Status

   Since there were male-female differences on this variable, as noted earlier, the age group comparisons were made separately for males and for females. Among the males, the 44 and under age group differed significantly from the 55-64 ($p<0.02$) and the 65 and over age groups on smoking ($p<0.001$). With the exception of the 55-64 age group, a greater proportion of males were smokers; there was a range of 45.6 per cent to 63.4 per cent who were smokers. The younger the age the greater was the proportion of males who smoked more than one package of cigarettes per day. The older the group, the greater was the proportion of males who smoked cigars and/or pipes.

   Among the females the 44 and under age group differed significantly from the 55-64 ($p<0.05$) and 65 and over age groups ($p<0.001$); the 45-54 and 55-64 age groups differed significantly from the 65 and over age group ($p<0.005$). Generally as age increased, smoking decreased. The females were predominantly nonsmokers; there was a range of 67 per cent to 94 per cent of nonsmokers from the youngest to the oldest age groups.

6. Self-Assessment of Tension

   There were no significant differences between age groups for either males or females on this variable.

### Comparisons Between Bangor Patients and Questionables and Matched Controls

Since there were significant sex and age differences within the control group, and age differences when the controls were compared with the patients and questionables, a matched sample was drawn from the control group for comparison with the patients

**Table 6—Patients in Bangor and Roseto by sex, mean age, mean years of education, and social class**

| Patients | Sex | | Mean Age | | Mean Years of Education | | Social Class | |
|---|---|---|---|---|---|---|---|---|
| | Male N= | Female N= | Male | Female | Male | Female | I-II-III N= | IV-V N= |
| Bangor | 23 | 13 | 60.8 | 66.8 | 9.3 | 9.8 | 6 | 30 |
| Roseto | 7 | 3 | 63.3 | 60.3 | 10.5 | 6.1 | 2 | 8 |

and questionables on the same variables examined previously.* The 36 patients and 36 questionables were individually matched with 72 controls on sex and age. Comparisons were made between these matched groups on the variables using a chi-square test for differences among correlated proportions as described by McNemar.[21]

There were no significant differences between the Bangor patients and their matched controls or the questionables and their matched controls on ethnic identification, educational mobility, geographical mobility, present smoking status, self-assessment of tension, income, education, occupation, or when education and occupation were combined in a social class index.

The patients, questionables, and their matched controls were compared using Lenski's concept of status crystallization. This concept provides information about the degree of continuity between a series of four vertical hierarchies (education, occupation, income, and ethnicity). The patients differed significantly from their matched controls on status crystallization ($p<0.02$). More of the patients tended to cluster midway between the extremes of the four hierarchies, whereas more of the controls tended to cluster at the extremes of high or low. This finding was not significantly related to age. The questionables, however, did not differ from their matched controls on status crystallization.

**Comparisons Between Bangor and Roseto Patients**

(a) Group Comparisons (Table 6)

No statistically significant differences were found between the Bangor male patients and Roseto male patients on age, education, or income when the two groups were compared by means of the Mann-Whitney *U* Test (Siegel[22]). The Bangor and Roseto female patients were examined on these variables and they differed significantly on education only ($p<0.02$). However, the sample is very small, and it would be difficult to make any statements concerning this finding.

As can be seen in Table 6 the ratio of male to female patients (2:1) is the same in both communities. No differences were found between the Bangor patients and Roseto patients on the proportion of individuals in the different social classes using the chi-square for a difference between two correlated proportions (Guilford[23]).

(b) Matched Pair Comparisons

The ten Roseto patients were individually matched with ten controls from the Roseto study sample. Therefore sex, age, ethnic identification (all Italian), and area of residence were controlled variables. No significant differences were found between the patients and their matched controls when they were compared by the Wilcoxon Matched-Pairs Signed-Rank Test[22] on education, income, or social class. In addition occupation was measured by means of Hollingshead's Occupational Scale and no significant differences were found for this variable.

* Since there were no sex or age differences in the control group on occupational mobility this variable was excluded from this analysis. No significant differences were found when comparisons were made between the entire control group, patients, and questionables on occupational mobility.

## Discussion of Results

Since sex and age have been shown to be related to coronary heart disease, these two variables were examined within the Bangor control group before comparisons between the controls, patients, and questionables were carried out. It was found that male and female controls differed significantly on present smoking status and self-assessment of tension; more males than females smoked and females considered themselves as tense or admitted to tension more readily that did the males. Differences related to age were also found within the control group. More of the male controls aged 44 and under were of mixed ethnic origins, geographically mobile, educationally upwardly mobile from their parents, and smoked more than one package of cigarettes per day, compared to male controls in older age groups. In accordance with findings from other studies, the male controls age 44 and under show "high risk" characteristics and are being closely followed.

When the entire control group was compared with the entire patient and questionable groups it was found that more patients and questionables than controls were older males. More of the patients were from the "blue-collar" socioeconomic groups, and more of the questionables were from the "white-collar" socioeconomic groups compared to the controls. The patient and questionable groups were more similar than different on most of the variables examined, differing only on social class, ethnic identification, and status crystallization. The questionables looked more like the patients on most of the objective variables. This led us to examine the possibility of differing social processes in the two diagnostic groups. An intensive examination of the subjective data elicited from the patients and questionables and their matched controls revealed several interesting observations. Most of the patients and their matched controls originated in the lower socioeconomic classes and like their fathers had predominately grammar school educations, but more patients achieved highly skilled, technical, and often supervisory positions than did their controls. The questionables appeared to be composed of two groups: one group had achieved middle or upper class positions having been both educationally and occupationally upwardly mobile from the lower social classes; another group originated in the middle or upper social classes and were not mobile. It seemed that the patient group was composed of individuals who were making attempts to become upwardly mobile and were not succeeding, whereas the questionable group was composed of individuals who were successfully upwardly mobile, but concerned about maintaining their positions. These observations will be the source of hypotheses in future studies in this area.

## Conclusion

The findings that the patients in Roseto and Bangor were more similar than different, and did not differ from their matched controls on the objective variables examined, are especially interesting since the communities of Roseto and Bangor differ notably in many respects (see Table 7).

Roseto is a lower socioeconomic community of exclusively Italian-Americans. Its inhabitants have closely-knit families and are generally mutually supporting and gregarious in social affairs. The majority of the inhabitants are Roman Catholic and adhere to religious traditions and dietary habits characteristic of their ethnic group. Bangor, on the other hand, is a typically small, eastern industrial, lower middle class community composed of English, Welsh, Germans, and Italians. Generally, Bangor-

**Table 7—Social differences between two adjacent communities**

| Roseto (Italian-American) | Bangor (English, Welsh, German, Italian) |
|---|---|
| 1. Common history and ancestry | 1. No common history or ancestry |
| 2. Ethnically uniform and cohesive | 2. Ethnically diverse with rivalries |
| 3. Italian traditions and customs retained | 3. No distinctive ethnic traditions or customs |
| 4. Italian diet retained | 4. American-type dietary habits |
| 5. Predominately Roman Catholic | 5. Predominately Protestant; many religious groups |
| 6. Family patriarchal, and close contact with extended families (clan association) | 6. Family unit less cohesive and extended family contact infrequent |
| 7. Gregarious in social affairs (community involvement) | 7. More formal, aloof, "lack of involvement" |
| 8. Social pressures to conform to culture | 8. Social affiliations of individual choice |
| 9. Mutually supporting in crises | 9. Stress independence, helping oneself |
| 10. Social clubs male-centered | 10. Social clubs cater to both sexes |
| 11. Male-female roles clearly defined | 11. Male-female roles overlap and sometimes ambiguous |
| 12. Average annual rates per 100,000 population of treated mental illness, 1950 to 1960 (public and private) males 162.2; females 234.6 (age-adjusted rates) (Bruhn, et al.[24]). | 12. Average annual rates per 100,000 population of treated mental illness, 1950 to 1960 (public and private) males 289.0; females 351.2 (age-adjusted rates). |

ians value the independence and self-sufficiency of the individual. In addition Bangor lacks the mutual supporting and gregarious aspects found in Rosetan social life. Bangor is predominately Protestant and as a community has no distinctive customs or traditions. Although some members of the different ethnic groups have retained their traditional dietary habits, for the most part the community's dietary habits are typically American. In both communities, the young, mobile, middle class are leaving to join the mainstream of American society.

The two communities were also found to have different rates of treated mental illness, but this finding could not be explained in terms of objective factors such as age, sex, diagnostic categories, or availability of psychiatric treatment (Bruhn, et al.[24]). However, the cultural norms and attitudes regarding mental illness, deviancy, and old age in the two communities were observed during our three-year contact with the residents of these communities and were found to differ.

Cassel[25] and his colleagues compared several rural communities in North Carolina with differing degrees of growth and change; the more stable communities had the lowest rates of total deaths and deaths from heart disease. Pursuing this finding, Tyroler and Cassel[26] explored the relationship between health and work group relationships in an industry. After adjusting for age differences, they found hypercholesteremia to be twice as prevalent among male employees who worked in changing work situations and were not in close continuous contact with the same group of fellow workers than among male employees doing similar jobs and who worked consistently together on the same shifts.

Similarly in our comparisons of the communities of Roseto and Bangor we find that the more homogeneous and stable of the two cultures has a lower death rate from myocardial infarctions

and lower rate of treated mental illness. Seemingly environmental factors which act in conjunction with personal attributes are more important than objective factors themselves. The relationships between group dynamics, culture, and the health status of residents in the two communities will be examined further in future studies.

## Summary

A community study of coronary heart disease was carried out in Bangor, Pa. This predominantly English, Welsh, German, Italian community was previously found to have a higher death rate from myocardial infarctions than Roseto, its exclusively Italian-American neighbor. A medical clinic was established in Bangor during the summer of 1964 to screen the adult residents for clinical evidence of coronary heart disease.

Of the total clinic sample (1,408), 984 individuals were interviewed and comprise the sociological sample (912 controls, 36 patients, and 36 questionables). The sociological sample was generally representative of the adult Bangor community by sex and age. When the control group was compared with the patient and questionable groups significant differences were found on sex, age, social class, and ethnic identification. Because sex and age differences were found between groups, the relevant social variables were examined within the control group, and it was found that there were sex differences on Present Smoking Status and Self-Assessment of Tension; age differences were found on Ethnic Identification, Educational and Geographical Mobility, and Present Smoking Status. A significant difference was found when the patient group was compared with the questionable group on social class; these groups were more similar than different on the other variables. Lastly, because sex and age differences were found among the controls, a sample was drawn from the control group and the patients and questionables were individually matched with controls by sex and age. The patients differed from their matched controls on status crystallization, the former having less "crystallization of status" than the latter. The questionables did not differ from their matched controls on this variable.

No significant variables emerged when group comparisons and matched pair comparisons were made between and within the Bangor and Roseto patient groups.

The Roseto and Bangor patients were more similar than different on the variables examined; however the two communities differed notably in their culture and group dynamics. The more homogeneous and stable of the two communities was found to have a lower incidence of deaths from myocardial infarctions and a lower incidence of treated mental illness.

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**American Public Health Association Membership Application Blank on Page XLIII**