Cancer Mortality, Ethnicity, and Socioeconomic Status: Two New York City Groups

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Synopsis ....

Cancer mortality rates for 1979-81 among Puerto Ricans and non-Hispanic whites in New York City are analyzed for cancer in six sites. They include cancers of the lung, esophagus, breast, stomach, colon, ovary, and all cancers. New York City health areas were divided into four quartiles representing four levels of income.

In general, Puerto Ricans in New York City have lower mortality rates from cancer than non-Hispanic white residents of the city. In comparing cancer mortality by quartile, Puerto Rican males show little variation. Puerto Rican females show their highest mortality rates from breast cancer in the wealthiest quartile, and non-Hispanic white women show highest mortality rates from breast cancer in the poorest quartile. Non-Hispanic white males show mortality rates from lung cancer in the poorest quartile that are distinctly higher than in the more affluent ones. For all groups, with the exception of Puerto Rican males, mortality rates from all cancers increased progressively with decreasing income. Factors influencing differential mortality rates by quartile appear to include tobacco use, alcohol consumption, occupational hazards, fertility, and differential use of health facilities.

IN SEARCHING FOR THE ETIOLOGY of specific cancers, the study of migrant groups has been particularly useful. When site-specific cancer incidence in a migrant group gradually approaches that of the general population, it is likely that the cancer is caused by exogenous factors in the new environment. On the other hand, when migrants have a distinctive pattern of cancer incidence that persists over long periods in their new country, genetic factors may be involved. Puerto Rican migrants to New York City constitute a theoretically interesting case study due in part to their unusual cancer profile. Their mortality rates from cancers of the esophagus, stomach, and cervix are above those of non-Puerto Ricans in New York City and, for cancers of the lung, breast, and ovary, their rates are relatively low (1).

Puerto Ricans are also theoretically interesting in that they have a very low income level compared with other groups and therefore can be studied to shed some light on the relationship between cancer mortality and socioeconomic status. For some time researchers have been interested in the finding that, in general, cancer patients of lower income levels have less favorable survival rates than higher income patients for almost every site, sex, stage, and disease group (2). In addition, certain cancers seem to have greater incidence among the poor, especially cancers of the esophagus, stomach, liver, larynx, and cervix (3).

An explanation offered for differential cancer mortality by income is that poorer patients are less likely to understand the nature of their symptoms and are less likely to turn quickly to a physician for help or to seek preventive examinations (4). It has also been suggested that lower income persons have less knowledge concerning the composition of a balanced diet and are less able to provide it (5).

A major problem in assessing the effects of poverty on cancer is that significant proportions of the poor may consist of immigrants who have imported unusual cancer profiles compared with the general U.S. population. For example, the lack of gradient between stomach cancer and social status in a New Haven study may have been caused by New Haven's unusually large population of Italian Americans who had extremely low rates of stomach cancer and who were found disproportionately in the low socioeconomic classes (3). Similarly, Puerto Ricans in New York City have

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Table 1. Population and number of deaths by ethnicity and ethnic concentration, New York City, 1979–81

Percentage of population with Puerto Rican ancestry	Population		Number of deaths	
	Puerto Ricans	Non-Hispanic whites	Puerto Ricans	Non-Hispanic whites
0–19.9	228,867	3,255,427	2,386	114,983
20.0–49.9	203,844	324,677	2,257	18,167
50.0–69.9	201,612	66,308	2,320	4,770
70 or more	224,582	21,967	3,525	2,037

SOURCES: U.S. Bureau of the Census, 1980 census (population data); New York City, Department of Health (death data).

extremely low rates of mortality for lung cancer, which is usually inversely related to income (5).

In this paper the relations between ethnic groups, socioeconomic level (as measured by income), and cancer are explored by studying the mortality rates from cancer of Puerto Ricans and non-Hispanic whites at four income levels.

Methods and Materials

Data on deaths for the years 1979–81 were supplied by the New York City Department of Health. Data on population, age structure, and median family income by health area were provided by the New York City Department of City Planning from unpublished data of the 1980 U.S. census summary tape files (STF 4). Deaths among institutionalized persons are not included in the data.

The 346 populated health areas of New York City (a few areas are not populated) were aggregated to four ethnic quartiles: those where Puerto Ricans constituted 0–19.9 percent of the "white" (Hispanic plus non-Hispanic white) population, 20.0–49.9 percent, 50.0–69.9 percent, and 70 percent or more. "Health areas" are composed of combinations of individual census tracts, each

health area being a contiguous unit with an average population of 25,000. The Puerto Rican population may not necessarily be the largest population in a health area, even when it is 70 percent or more of the white population, because of the study's particular definition of ethnic concentration as to percentage of the combined Hispanic and non-Hispanic white population who are of Puerto Rican ancestry. Some health areas may be predominantly black, for example. Also, because concentration was not defined by geographic boundaries, health areas of a particular concentration need not be contiguous. The population and deaths by ethnic concentration are given in table 1.

To estimate the income level in each ethnic quartile, the median family income of each of the 346 health areas was obtained from the New York City Department of City Planning from unpublished data of the 1980 U.S. census summary tape files (STF 4). Median family incomes were ranked in order from lowest to highest, and the list was divided into four income quartiles comprised of equal numbers of health areas. The percentage was then taken of the health areas of each of the ethnic quartiles that fell into each of the income quartiles. The ethnic quartiles with the largest Puerto Rican ancestry population fell predominantly into the poorest income quartile, the ethnic quartile with the smallest Puerto Rican ancestry population fell predominantly into the wealthiest income quartile, and the remaining two ethnic quartiles also showed an inverse correlation between size of Puerto Rican population and level of income (table 2).

The ethnic quartile that is 0–19.9 percent Puerto Rican and has the highest income will be referred to as quartile 1, the quartile that is 20.0–49.9 percent Puerto Rican with the next highest income as quartile 2, the quartile that is 50.0–69.9 percent Puerto Rican with the second lowest income as quartile 3, and the quartile that is 70 percent or more Puerto Rican with the lowest income as quartile 4.

Because of the differences in the age structure of the populations, death rates were age-adjusted by the direct method of standardization, using the U.S. total 1980 population as a standard, based on 11 age groups. All mortality rates are based on 3-year averages of deaths and expressed per 100,000 population.

As a result of unprecedented changes by the Census Bureau in assigning race in the 1980 census, numerator data (deaths) both at the local

and national levels do not correspond to denominator data (population). The modification in the 1980 census concerned persons who did not mark one of the races listed but instead marked the "other race" category and wrote in a Latin American country or an Hispanic-origin group. These persons remained in the "other races" category, in contrast to previous censuses and in vital statistics in which such responses were almost always coded in the "white" category (6). Information on Spanish or Hispanic origin was derived from a question asked of all persons. Persons of Spanish or Hispanic origin were asked to specify if they were of Mexican, Puerto Rican, Cuban, or other Spanish or Hispanic origin.

Findings

Cancer site. Age-standardized mortality rates for selected cancers among Puerto Ricans and non-Hispanic whites in New York City for all health areas are shown in table 3. In general, Puerto Ricans in New York City have lower mortality rates from cancer than non-Hispanic white residents of the city. Puerto Rican males show particularly low rates for cancers of the lung and colon, but elevated rates relative to non-Hispanics for cancers of the esophagus and stomach. Female Puerto Ricans have low rates for cancers of the lung, breast, colon, and ovary, and elevated rates for cancers of the esophagus and stomach in a pattern similar to Puerto Rican males.

Lung cancer. Analysis of table 4 data shows that the Puerto Rican population has distinctly lower mortality rates from lung cancer in all four quartiles relative to non-Hispanic whites. Among Puerto Ricans there is little variation by quartile, with male rates more than twice the female rates in all four quartiles. Non-Hispanic white males, on the other hand, have distinctly higher rates in the poorest quartile. Non-Hispanic white females show no clear gradient with quartile. As in the Puerto Rican population, non-Hispanic white females have much lower rates of lung cancer than males in all quartiles.

Esophageal cancer. Puerto Rican males have the highest mortality rates from esophageal cancer in quartile 3; Puerto Rican females show the highest rates in quartile 4. Non-Hispanic white males have the highest mortality rates in quartile 4, and non-Hispanic white women show no clear gradient with quartile.

Table 2. Percentage of health areas by level of Puerto Rican population of the area and median family income

Percentage of population with Puerto Rican ancestry	Median family income quartile			
	(4) $4,770– 10,027	(3) $10,070– 15,797	(2) $15,957– 20,497	(1) $20,665– 67,025
0–19.9	2	16	38	44
20.0–49.9.	22	61	16	0
50.0–69.9.	75	22	3	0
70 or more.	88	13	0	0

SOURCE: New York City Department of Health, unpublished data from 1980 census, summary tape files (STF 4).

Table 3. Age-standardized mortality rates per 100,000 population and mortality differentials for cancer by ethnicity, New York City, 1979–81

Cancer	Puerto Ricans		Non-Hispanic whites		Ratio of deaths
	Number of deaths	Mortality rate	Number of deaths	Mortality rate	Puerto Ricans: other whites
Males					
Lung	156	27.9	4,709	65.6	.43
Colon	66	15.0	2,081	28.9	.52
Esophagus . .	50	9.9	389	5.5	1.82
Stomach	64	14.1	844	11.7	1.21
All cancers . .	744	161.1	15,967	227.5	.71
Females					
Lung	73	10.7	2,155	21.6	.49
Breast.	110	11.7	3,327	34.8	.34
Colon	82	11.5	2,190	19.4	.59
Esophagus . .	21	3.0	186	1.7	1.80
Stomach	60	8.6	637	5.6	1.53
Ovary	27	3.3	909	9.3	.35
All cancers . .	715	101.4	15,902	154.0	.66

SOURCES: U.S. Bureau of the Census, 1980 census (population data); New York City Department of Health (death data).

Breast cancer. Puerto Rican women in quartile 1 (the wealthiest group) have the highest rates of breast cancer. Non-Hispanic white women show progressively higher rates with lower income levels; the highest rate is in quartile 4. Non-Hispanic white women have at least twice the breast cancer rate of Puerto Rican women in all quartiles. The differences are greatest in quartile 4, where non-Hispanic women have more than five times the rate of Puerto Rican women.

Stomach cancer. Both groups show relatively low rates of stomach cancer in quartile 1. Puerto Rican males and females have their highest rates in quartile 3. The highest rate of non-Hispanic white

Table 4. Age-standardized mortality rates per 100,000 population for selected cancer sites by sex, ethnicity, and ethnic concentration, New York City, 1979–81

Cancer	Ethic quartiles							
	1 (wealthiest) 0–19.9 percent		2 20.0–49.9 percent		3 50.0–69.9 percent		4 (poorest) 70 percent or more	
	Puerto Ricans	Non-Hispanic whites	Puerto Ricans	Non-Hispanic whites	Puerto Ricans	Non-Hispanic whites	Puerto Ricans	Non-Hispanic whites
Lung:								
Males..........................	24.1	62.9	33.9	76.7	27.3	77.1	26.8	99.7
Females......................	10.4	21.1	10.1	22.7	12.2	21.8	10.6	23.3
Esophagus:								
Males..........................	7.3	5.0	[1]7.5	8.1	[1]7.8	7.5	9.8	[1]8.9
Females......................	[1]1.3	1.6	[1]2.6	1.1	[1]4.0	[1]1.7	[1]4.3	[1]1.1
Breast: females.................	14.1	33.4	10.9	37.7	9.6	45.3	11.0	59.1
Stomach:								
Males..........................	8.2	10.8	16.6	16.1	16.9	14.5	16.2	[1]14.8
Females......................	[1]3.4	5.4	7.3	6.3	12.7	3.5	12.2	[1]11.3
Colon:								
Males..........................	14.0	27.8	14.9	31.1	14.6	35.8	15.7	36.6
Females......................	10.2	18.5	11.1	21.5	11.1	20.4	13.2	19.2
Ovary: females	[1]3.1	9.1	[1]2.4	9.1	[1]1.9	14.2	4.8	[1]8.4
All cancers:								
Males..........................	140.1	219.0	177.6	254.8	169.7	272.9	158.9	351.1
Females......................	82.3	149.0	93.3	162.7	95.6	179.9	128.1	220.2

[1]Based on 10 cases or less.
SOURCES: U.S. Bureau of the Census, 1980 census (population data); New York City Department of Health (death data).

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males is in quartile 2, and the highest rate of non-Hispanic white females is in quartile 4.

Colon cancer. Puerto Ricans in general have extremely low mortality rates from colon cancer relative to non-Hispanic whites in all four quartiles. Puerto Rican males and females show little variation by quartile, with only a slight increase in quartile 4 for both sexes. Non-Hispanic white males show their highest rates in quartile 4,

and non-Hispanic females show their highest rate in quartile 2.

Ovarian cancer. There was no clear gradient by quartile for ovarian cancer in either group. However, analysis of table 4 shows quite different patterns by ethnicity. For Puerto Rican women there are relatively low rates in all quartiles, with the highest rates in quartile 4. For non-Hispanic white women there are distinctly higher rates in quartile 3, precisely where Puerto Rican women have their lowest rates.

All cancers. With the exception of Puerto Rican males, mortality rates from all cancers progressively increased from quartile 1 to 4. For Puerto Rican males, the lowest rates are found in quartile 1 and the highest rates in quartile 2, with a decrease through quartiles 3 and 4. For Puerto Rican females the rates increase with decreasing income, so that the highest rates are in quartile 4. Both non-Hispanic white males and females show a clear gradient with income, having the lowest rates in quartile 1 and the highest rates in quartile 4. In all quartiles, the Puerto Rican rates are distinctly lower than those for non-Hispanic whites.

In general, it appears that some cancers are more likely than others to vary with socioeconomic

quartile. Esophageal and stomach cancers show no clear gradient, but rates are higher for Puerto Rican females in the two poorer quartiles than in the wealthier ones. Breast cancer varies with socioeconomic level, but in different directions for women of the two different ethnic groups. Lung cancer and colon cancer show a relationship with quartile only for non-Hispanic white males who have the highest rates in the poorest quartiles. Overall, cancer mortality rates seem to be highest in the poorest ethnic quartiles.

Discussion

In analysis of the comparative mortality rates it is important to consider the high mobility of the Puerto Rican population and the ease of moving between the mainland and the island. If the return migration were selective of Puerto Ricans of a particular socioeconomic level, deaths from their respective quartiles would not be recorded, and the estimation of the mortality rates would be too low for that quartile. However, studies of Puerto Rican migrants have shown that the return migrants are heterogenous (7). Therefore, even if large numbers move from the mainland back to Puerto Rico, there is no reason to assume that Puerto Ricans of one ethnic quartile would be disproportionately more likely to move than those of another, and we can still compare the rates of the four different quartile populations.

Puerto Ricans and non-Hispanic whites were found to have quite different cancer profiles by quartile. The low levels of stomach and esophageal cancer among Puerto Ricans in the wealthiest quartiles are probably due to acculturation to dietary habits and lifestyle of the general population. Stomach cancer is highly sensitive to the environment (8). Also, because persons with stomach cancer have poor 5-year survival rates that can be lengthened by early detection, underdiagnosis and underutilization of health facilities in the poorer quartiles could be expected to result in higher death rates. Like stomach cancer, cancer of the esophagus is rapidly lethal (9) and in general is associated with alcohol and poverty.

Breast cancer rates are highest for non-Hispanic white women in the poorest quartile and highest for Puerto Rican women in the wealthiest quartile. Although the Puerto Rican rates reflect in general the finding that breast cancer incidence rises with social status (3), the opposite trend among the non-Hispanic white women may reflect the fact that mortality from breast cancer is highest among

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Table 5. Age-standardized mortality rates per 100,000 population for all causes of death by sex, ethnicity, and ethnic concentration, New York City, 1979–81

Quartile and percentage Puerto Rican ancestry	Puerto Ricans		Non-Hispanic whites	
	Males	Females	Males	Females
1. 0–19.9.........	778.6	463.0	993.8	596.4
2. 20.0–49.9.......	960.0	538.0	1,252.0	735.0
3. 50.0–69.9.......	1,045.1	595.2	1,507.0	910.3
4. 70 or more......	1,165.6	656.5	2,230.8	1,265.5

SOURCES: U.S. Bureau of the Census (population data); New York City Department of Health (death data).

the poor (10). Another possibility is that non-Hispanic white women who live in predominantly Puerto Rican neighborhoods may be disproportionately single or childless, increasing their risk of breast cancer.

Mortality from lung cancer among non-Hispanic whites follows the pattern usually found in epidemiologic studies—higher rates among males than females and relatively high rates in low-income areas (3). Cigarette smoking is considered to be the principal cause of lung cancer, and studies in 1975 found decreasing proportions of smokers with increasing education except for the lowest education group. Among the more affluent, fewer males and more females were smokers (5). In addition, certain hazards of the workplace such as asbestos and radon have been found to be not only carcinogens in themselves, but to be more dangerous when combined with tobacco smoke (5).

Interestingly, Puerto Rican males have low rates of mortality from lung cancer, not much influenced by income quartile and only slightly higher than the rates of non-Hispanic white females.

A comparison of the mortality rates for all cancers with mortality rates from all causes of death shows that, for Puerto Rican females and both male and female non-Hispanic whites, cancer mortality rises as income decreases. Puerto Rican males are the exception to this trend.

Although recent studies have suggested that air pollution in New York City may be causing high levels of lung cancer in areas that are different demographically (*11*), the finding here of low rates among Puerto Rican males and females and non-Hispanic white females argues against a simple relationship between pollution and lung cancer because males and females of both populations would be expected to respond similarly. The rate of cigarette smoking is the most likely cause for differences in lung cancer.

Do the patterns observed here apply only to cancer mortality or are they part of the larger trend of general mortality? A comparison of the mortality rates for all cancers with mortality rates from all causes of death (table 5) shows that, for Puerto Rican females and both male and female non-Hispanic whites, cancer mortality rises as income decreases. Puerto Rican males are the exception to this trend, having their highest mortality from all cancers in quartile 2 (table 4). One possible explanation for the lack of a gradient among Puerto Rican males may be that the lifestyle factors responsible for the most important causes, such as lung cancer, may be more homogeneous across the socioeconomic quartiles, while among non-Hispanic white men (a much more heterogeneous group) those factors may vary more with socioeconomic level.

This finding and the fact that non-Hispanic white males have unusually high mortality rates in the poorest quartiles suggest areas for research. In particular, factors that need to be further investigated are aspects of lifestyle such as tobacco use, alcohol consumption, occupational hazards, and their interaction.

References ....

1. Rosenwaike, I.: Mortality among the Puerto Rican-born in New York City. Social Sci Q 64: 375–385 (1983).
2. Linden, G.: The influence of social class in the survival of cancer patients. Am J Public Health 59: 267–274 (1969).
3. Graham, S, Levin, M., and Lilienfeld, A. M.: The socioeconomic distribution of cancer of various sites in Buffalo, N.Y., 1948–1952. Cancer 13: 180–191 (1960).
4. Howard, J., Lund, P., and Bell, G.: Hospital variations in metastatic breast cancer. Med Care 18: 442–455 (1980).
5. Devesa, S. S. and Diamond, E. L.: Socioeconomic and racial differences in lung cancer incidence. Am J Epidemiol 118: 818–831 (1983).
6. Vital statistics of the United States, 1980. Vol. II, Section 6, life tables. DHHS Publication No. (PHS) 84-1104. National Center for Health Statistics, Hyattsville, MD, 1984.
7. Myers, G. C., and Muschkin, C. G.: Demographic consequences of migration trends in Puerto Rico. Int Migration 22: 214–227 (1984).
8. Schottenfeld, D., and Fraumeni, J.: Cancer epidemiology and prevention. W. B. Saunders Co., Philadelphia, 1982.
9. Ming, S.: Tumors of the esophagus and stomach. Atlas of tumor pathology. Series 2, No. 7. Armed Forces Institute of Pathology, Washington, DC, 1973.
10. Dayal, H. H., Power, R. N., and Chiu, C.: Race and socio-economic status in survival from breast cancer. J Chron Dis 35: 675–683 (1982).
11. Israel, M., Lee, J., and Nelson, F.: Trends in respiratory cancer deaths, New York City, 1960–1980. New York City Department of Health, Office of Biostatistics, 1983.