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# Lung Cancer Rates in the Hispanic Population of Connecticut, 1980-88

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## Synopsis .....

*To identify lung cancer patients of Hispanic ethnicity, surnames in the Connecticut Tumor Registry were matched with the 1980 Spanish surname list of the U.S. Bureau of the Census. Also death certificates for women with lung cancer in the registry were examined to ascertain maiden names.*

*For women Hispanic surnames in the registry were not good indicators of ethnicity; their sensitivity was only 58 percent when compared with the decedent's maiden name.*

*Estimated age-specific incidence rates for lung cancer during the 1980-88 period among Hispanic men, using surnames in the registry, were lower than the rates for non-Hispanic men, as expected from studies of Hispanic mortality in the Northeast. The distribution of histologic types, including those most strongly associated with smoking, was similar for Hispanic and non-Hispanic men. Although estimated lung cancer mortality rates were low for Hispanic men defined by surname, higher standard mortality ratios for Puerto Rican-born versus other Hispanic men suggested heterogeneity in lung cancer death rates of the Hispanic population of Connecticut.*

*Lung cancer incidence and mortality rates should continue to be monitored in the Hispanic population of Connecticut, in view of anticipated increases attributable to trends in smoking behavior, and interventions should be planned to counteract anticipated increases.*

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**S**URNAMES HAVE BEEN USED in studies of cancer incidence among Hispanics in areas where Hispanics are predominantly Mexican American, such as Colorado, Texas, California, and New Mexico (1,2). Although cancer incidence and mortality data have been published for immigrant Hispanic populations in the Northeast (that is, New York and Connecticut) and other areas (for example Illinois) (3-6) surnames apparently have not been used for estimating incidence rates for total Hispanic populations in these areas.

Considered in this paper is the potential utility of lists of Spanish surnames in estimating lung cancer incidence rates for the Hispanic population of Connecticut. Hispanics are a fast-growing segment of the U.S. population, including that in the Northeast; in Connecticut the Hispanic population increased from 124,499 (or 4.0 percent of the

population) in 1980 to 213,116 (6.5 percent of the population) in 1990. In the 1980 census 71.0 percent of all Hispanics in Connecticut were of Puerto Rican origin, with 3.6 percent Mexican, 4.5 percent Cuban, and 20.9 percent "other Spanish," which includes persons with ancestry in South and Central America (7). In the 1990 census, 68.9 percent of all Hispanics in Connecticut were of Puerto Rican origin.

## Methods

The population-based Connecticut Tumor Registry, which is part of the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) Program, does not attempt to collect information on Hispanic ethnicity. The Bureau of the Census' 1980 list of Spanish surnames, shown

Table 1. Age-specific incidence rates for lung cancer in Hispanic<sup>1</sup> versus all other men residing in Connecticut, 1980–88

Age (years)	Hispanics		Others		Ratio <sup>2</sup>	95 percent CI <sup>3</sup>
	Number	Rate	Number	Rate		
25–34	2	1.6	33	1.5	1.06	0.13–3.83
35–44	6	7.2	266	14.3	0.50	0.18–1.09
45–54	31	61.9	1,137	78.9	0.78	0.54–1.12
55–64	33	114.0	3,523	255.3	0.45	0.31–0.64
65–74	34	242.8	4,405	472.1	0.51	0.36–0.72
75 and older	29	389.4	2,736	560.7	0.68	0.46–0.98

<sup>1</sup> Cancer cases of Hispanic persons were defined by Spanish surname, while Hispanic population was estimated from census data (see text).

<sup>2</sup> Ratio of rate in Hispanics to rate in all others.

<sup>3</sup> 95 percent confidence interval of the ratio.

to be an improvement over the 1970 census list in identifying persons who would report themselves as being Hispanic in a census (8), was used in this study for the identification of cancer patients in the registry who were possibly Hispanic. To identify Mexican Americans in certain ethnicity situations, use of both parental surnames has been proposed as an improvement over use of individual surname (9). In this study an estimate of the usefulness of the individual surname in the registry in identifying probable Hispanic women was obtained by comparing the surname with the paternal surname (that is, maiden name), which was available from death certificates for women who had died in Connecticut; maiden name of the deceased's mother was not available.

In analyses of cancer incidence, all lung cancers diagnosed in 1980–88 among Connecticut residents and reported to the registry were included; 1988 was the latest year of diagnosis for which registry data were considered to be complete. Surnames in the registry were matched with the 1980 census Spanish surname list both manually and by computer. Manually, computer-generated lists of lung cancer patients were compared with a hard copy list of the Census Bureau's 1980 list of Spanish surnames. The computer matching required an exact match of the surname in the computerized Spanish surname file and the registry file. This matching did not detect a few compound or hyphenated surnames because the registry's computer file did not contain a space or hyphen between the two elements of the compound. The manual procedure underestimated matches slightly because of clerical errors, as was also found by the U.S. Census Bureau (8). Hard-copy registry files were pulled for all persons with surnames matching the 1980 census Spanish-surname list for verification of residency in Connecticut at the time of diagnosis of lung cancer and for obtaining information on smoking history that is not computerized.

The availability of information in registry records on the smoking habits of persons with lung cancer cases was assessed. Such information, if available, may be reasonably valid; in Missouri the concordance between information from interviews and registry data was 83 percent for never-versus ever-smoking status (10). The histological type of lung cancer, which varies according to smoking history (11), was available for about 85 percent of lung cancer cases in the registry, and the type for Hispanic men was compared with that for all other men diagnosed with lung cancer in 1980–88.

Mortality rates from lung cancer listed as the underlying cause of death were estimated for Hispanics by using names on death certificates (that is, maiden name for women and individual surname for men). The woman's maiden name was unknown for only 3.0 percent (155 of 5,199) of deaths from lung cancer in Connecticut residents in 1980–88. Names from death-certificate computer files were matched manually to the 1980 Bureau of the Census list of Spanish surnames to identify lung cancer decedents who were probably Hispanic; reference was also made to the results of the computerized surname matching of persons with lung cancer in the registry, many of whom were known to have died.

Estimates of the Hispanic population of Connecticut for 1980–88 were obtained by linear interpolation between the 1980 and 1990 U.S. censuses; in these censuses, Hispanics are identified by responses to a separate question on Hispanic-Spanish origin and may be of any race. Connecticut Hispanic populations were estimated for age groups 25–34, 35–44, 45–54, 55–64, 65–74, and 75 and older. Estimated age-specific incidence rates were obtained by dividing the number of incident cancers by the estimated population for 1980–88. Confidence intervals (CI) of 95 percent were calculated (12) for the ratio of the age-specific rate for Hispanics to the corresponding rate for all others

(non-Hispanics) for 1980–88. In Connecticut, racial groups other than white (including the “other race” category) comprised only 9.9 percent of the population counted in the 1980 census and 13.0 percent in the 1990 census, so that non-Hispanics include only small numbers of nonwhites.

Standardized incidence ratios (SIRs) and standardized mortality ratios (SMRs) for all age groups combined were also calculated for Hispanics. That is, expected numbers for each age group were calculated by multiplying the age- and sex-specific rates for the total State (all racial and ethnic groups combined) by the corresponding Hispanic population; the ratio of the total observed number of cases (or deaths) to the total number of expected events is the standardized ratio (SIR or SMR); 95 percent confidence limits on these ratios were calculated (12).

## Results

**Lung cancer incidence among men.** Of 139 Spanish-surnamed men with lung cancer diagnosed in 1980–88 identified through matching of surnames, only 11 (or 7.9 percent) did not have birthplace recorded in the registry. Birthplace was used in assessing the accuracy of the matching of surnames in the registry with the 1980 census Spanish-surname file. Eight Spanish-surnamed persons born in Portugal were not excluded because a small proportion of Portuguese-origin persons in Connecticut classified themselves as Hispanic or Spanish origin in the 1980 census (7), and the term “Hispanic” is sometimes used to indicate origin from Portugal as well as Spain (13); nevertheless, the Census Bureau’s 1980 Spanish-surname list is not intended for use in areas with large Portuguese-origin populations (8). Seven men born in Spain, two in the Philippines, and two in Italy were not excluded, but one born in Poland was omitted because the surname was an apparent truncation of a non-Spanish surname. In addition, three Spanish-surnamed men coded as residents of Connecticut were omitted after examination of case records showed that the patients had traveled from Puerto Rico to the United States mainland after being diagnosed with lung cancer.

After these exclusions the majority of the 135 Hispanic men were born either in Puerto Rico (40.7 percent) or the U.S. mainland (29.6 percent), with 7.4 percent born elsewhere in the Caribbean or in Central or South America; none were born in Mexico.

Estimated age-specific incidence rates for His-

Table 2. Comparison of individual surname in Connecticut Tumor Registry with maiden name on death certificate of women diagnosed with lung cancer, Connecticut, 1980–88

Surname in registry	Maiden name on death certificate		
	Spanish	Non-Spanish	Total
Spanish .....	18	29	47
Non-Spanish .....	13	4,485	4,498
Total .....	31	4,514	4,545

Table 3. Histologic type for Hispanic versus all other men diagnosed with lung cancer while residing in Connecticut, 1980–88

Type	Hispanics		Others	
	Number	Percent	Number	Percent
Squamous cell .....	48	35.6	3,799	31.3
Adenocarcinoma ...	37	27.4	3,027	24.9
Large cell .....	12	8.9	1,104	9.1
Small, oat cell .....	18	13.3	1,926	15.8
Other .....	5	3.7	567	4.7
Unspecified .....	15	11.7	1,733	14.3
Total .....	135	100.0	12,156	100.0

panic men were consistently lower than rates for all other men, except for ages 25–34 years, although there were only two Hispanic patients in this age group (table 1). The standardized incidence ratio (SIR) for all ages combined was 0.57 (95 percent CI = .48 to .68).

**Lung cancer incidence among women.** The registry data base does not include the maiden name. Some 4,766 of the 6,789 women diagnosed with lung cancer in 1980–88, however, were known to have died in 1980–89 from any cause, and the maiden name was obtained from death certificates for all but 221 (that is, 4.6 percent of 4,766). Table 2 shows that only 18 of 31 women (or 58.1 percent) with a Spanish maiden name had a Spanish surname in the registry; this low “sensitivity” of the registry record surnames suggests that some Hispanic women (that is, women with a Spanish maiden name) were married to non-Hispanic men. The “positive predictive value” of individual surname was 38.3 percent (that is, 18 divided by 47; table 2), suggesting that non-Hispanic women (that is, women without a Spanish maiden name) were married to Hispanic men. In view of these apparent errors in classification of probable Hispanics using registry surnames, incidence rates were not estimated for Hispanic women.

Table 4. Age-specific lung cancer mortality rates for Hispanic versus other residents of Connecticut by sex, 1980–88

Age group (years)	Men						Women					
	Hispanic		Other		Ratio <sup>1</sup>	CI <sup>2</sup>	Hispanic		Other		Ratio <sup>1</sup>	CI <sup>2</sup>
	Number	Rate	Number	Rate			Number	Rate	Number	Rate		
25–34	1	0.8	13	0.6	1.33	0.03–7.41	0	0.0	19	0.8	0.00	0.00–2.92
35–44	7	8.4	168	9.2	0.91	0.36–1.87	1	1.1	146	7.7	0.14	0.00–0.78
45–54	15	30.0	798	57.3	0.52	0.29–0.86	9	16.2	504	34.3	0.47	0.22–0.89
55–64	20	69.1	2,560	189.3	0.37	0.23–0.57	10	30.1	1,406	93.8	0.32	0.15–0.59
65–74	19	135.7	3,482	378.8	0.36	0.22–0.56	9	47.0	1,760	147.1	0.32	0.15–0.61
75 and older	21	282.0	2,580	537.2	0.52	0.32–0.80	3	25.2	1,331	141.9	0.18	0.04–0.53

<sup>1</sup> Ratio of rate for Hispanics to rate for all others. <sup>2</sup> CI = 95 percent confidence interval of the ratio.

**Histology and smoking habits of men.** Histology and smoking history were examined only for men. The distribution of histologic types was similar among Hispanic and non-Hispanic men with lung cancer diagnosed in 1980–88 (table 3), and none of the differences was statistically significant.

Review of individual case records of the 135 Hispanic men showed that smoking status was unknown for 34, or 25.2 percent; 89, or 65.9 percent, had ever smoked cigarettes; 6 or 4.4 percent were “nonsmokers;” 5 smoked only cigars; and 1 only a pipe. Among the 89 cigarette smokers, 36 or 40.4 percent had smoked 2 or more packs per day (including 8 described only as “heavy” smokers, who were assumed to have smoked at least 2 packs per day). If smoking histories available only as total pack-years are included, the usual amount smoked was unknown for 27 or 30.3 percent.

Computerized data on smoking were limited to registry patients diagnosed in 1985–88 and to “ever” versus “never” smoked categories; the 71.7 percent who “ever smoked” was similar to the 75.0 percent figure (50 of 67) for Hispanic men diagnosed in 1985–88.

**Lung cancer mortality.** Estimated mortality rates were lower for Hispanics versus others for both men and women, except for men 25–34 years old (table 4). The SMRs for all ages combined were 0.45 (CI = 0.36 – 0.56) for men and 0.31 (0.22 – 0.44) for women.

SMRs were also calculated for Puerto Rican-born persons, who were presumed to be Hispanics. Since population estimates for this subgroup were available only from the 1980 census, SMRS were estimated only for 1980–84, and the 1980 census age- and sex-specific estimates of the Puerto Rican-born population (6) were used for the entire 1980–84 period. The Puerto Rican-born population was subtracted from the census-estimated total

Hispanic population to provide an estimate of the populations of “other Hispanics.”

For men, the estimated SMR for Puerto Rican-born (22 observed versus 28.8 expected) was 0.76 (95 percent CI=0.48–1.15), while that for other Hispanic men (14 observed versus 44.6 expected) was lower (that is, 0.31 with 95 percent CI=0.17–0.52). The estimated SMR for Puerto Rican-born women was 0.46 (95 percent CI=0.20–0.91), and that for other Hispanic women was only slightly lower (that is, 0.35 with 95 percent CI=0.14 – 0.72).

## Discussion

**Study limitations.** U.S. Bureau of the Census analyses comparing surnames with self-reported Hispanic ethnicity suggest that use of surnames outside the southwestern States involves “errors of omission” of 21 percent for men (11 percent for Puerto Rican-origin men) (8). Although these errors may be largely offset by the designation of some non-Spanish-origin persons as Spanish-origin (8), errors in age-specific cancer rates for men may have occurred in this study. Inclusion of Spanish-surname persons born in Portugal and certain other European countries as Hispanic may have resulted in overestimation of rates for Hispanics. Lack of adjustment of populations for undercounting of “illegal immigrants” in the census should have had a small effect on estimated cancer rates for Hispanics in Connecticut, because the majority are from Puerto Rico (whose natives are U.S. citizens), but rates for other Hispanic subgroups may have been overestimated.

**Lung cancer incidence.** The ratios of age-specific lung cancer incidence rates for Hispanic to non-Hispanic men in Connecticut were low (that is, .45 – .78) for age groups 35–44 to 75 years and older (table 1). Apparently the only other published

study of cancer incidence in an entire Hispanic population of a northeastern region is from New York City; it was based on data from the New York State Cancer Registry which includes a Spanish-origin item. Estimated average annual age-adjusted lung cancer incidence rates (per 100,000) in 1982–85 were lower for Hispanics than non-Hispanics (that is, 51.5 versus 73.2, or a ratio of .70 for men, and 14.1 versus 31.8 or a ratio of .44 for women) (14). The ratio for men, while less than 1.00, is higher than the SIR of .57 reported in this study, and the rates for New York City Hispanics may have been underestimated because the Spanish-origin item in the New York State Cancer Registry was not filled out for 45 percent of cancer patients; all of those with no entry were assumed to be non-Hispanics (14).

While SIRs for lung cancer (1980–86) in the Puerto Rican-born men in both Long Island (5) and Connecticut (6) approached 1.00, these studies excluded Hispanics from other parts of the Caribbean and Central and South America (or about 30 percent of the Hispanic population of Connecticut) who may have lower lung cancer rates than other Hispanics.

Among men with lung cancer (incident cases) there was no evidence that histologic types more strongly associated with smoking (for example, squamous cell carcinoma) were less common among Hispanics than all others (table 3). A large proportion of Hispanic men with lung cancer had a positive smoking history, but case-control studies would be needed to evaluate the strength of the association in Hispanics compared with others.

Lung cancer incidence rates were not estimated for Hispanic women because examination of the maiden names of patients who had died suggested that misclassification would occur with the use of individual surnames in the registry (table 2). Although the positive predictive value (PPV) of individual surname was only 38.3 percent in this population (table 2), PPV depends on the prevalence of the factor predicted (in this case, Hispanic ethnicity), and higher PPVs for use of individual surnames would be expected in populations with a higher prevalence of Hispanics. In Connecticut, only 4.0 percent of the population was Hispanic in the 1980 census (and 6.5 percent in the 1990 census). Also, misclassification may be greater in the Northeast than in other regions of the United States because marriage between Hispanics and non-Hispanics is more common in the Northeast where Puerto Rican-origin Hispanics predominate, than in the West or Southwest, where Hispanics are mainly Mexican Americans (15,16), and where

cancer incidence studies have used surnames (1,2).

In view of the low 5-year survival rates of persons with lung cancer, for past years (perhaps 1980–84) maiden names of women with lung cancer who were known to have died could provide a crude estimate of the incidence, but analyses of incidence for more recent years, when fewer persons have died, requires information on maiden name for all women with cancer. The Connecticut Tumor Registry's recently revised tumor abstract form (which is completed in hospitals) will include maiden name, and estimation of incidence rates for Hispanic women may be feasible in the future, especially if the validity of the assumption that all women with (and few without) Spanish maiden names would identify themselves as Hispanic can be confirmed by special surveys.

**Lung cancer mortality.** In Connecticut, age-specific mortality rates were lower for Hispanic versus non-Hispanic men, defined by individual surname (table 4), and the SMR for all ages was 0.45 (0.36 – 0.56). In Suffolk County on Long Island, NY, the SMR for lung cancer among Hispanic men in 1979–83 was also low (that is, 0.56, 95 percent CI = 0.37 – 0.82), although this may be an underestimate because death certificate reporting of Spanish origin was used (17). A Spanish-origin item was not added to the death certificate in Connecticut until 1989, and the completeness and validity of such reporting are undoubtedly inadequate. Therefore, in Connecticut, reliance on matching of surnames with Spanish surname lists will continue.

While SMRs for lung cancer in all Hispanic men were low in Connecticut, higher estimated SMRs for the Puerto Rican-born subgroup versus other Hispanic men suggest heterogeneity in lung cancer risks within Hispanic men. Heterogeneity by age group also may exist, but data are sparse for younger ages. The ratios of mortality rates for Hispanic to non-Hispanic men were near 1.0 for younger men (25–34 and 35–44 years) in 1980–88, but were based on few cases (table 3); similar data should be examined for other Hispanic populations in the Northeast, such as New York City. Birth-place should be examined within each age group to determine if a generation effect is involved, perhaps reflecting higher smoking rates in more acculturated men born on the U.S. mainland.

Use of maiden names, available for more than 97 percent of women diagnosed with lung cancer who had died, suggested that lung cancer mortality rates were considerably lower among Hispanic than all other women (table 4); the SMR for all ages was

0.31 ( 95 percent CI= 0.22 - 0.44). On Long Island, the estimated SMR for lung cancer in women identified as Hispanic on death certificates in 1979-83 was 0.28 (95 percent CI = 0.11 - 0.58) (17). For Puerto Rican-born women, lung cancer mortality rates were also low in New York City (3) and in the entire United States (18) in 1979-81.

## Conclusion

The low estimated incidence rates for Hispanic men and the low mortality rates for both men and women suggest that, at least in the past, smoking was infrequent among Hispanics in Connecticut. Smoking-related morbidity and mortality, however, are expected to increase among all U.S. Hispanic men and women in the 1990s (19,20) in accord with time trends in the prevalence of smoking. Such increases also are anticipated among Hispanics in the Northeast. In samples of ninth graders in Connecticut schools in 1987-88, smoking prevalence was similar for Hispanics and Anglos for both boys and girls; data were not obtained by Hispanic subgroup ("Targeting Health Education for Minority Youth" by M. Adams and S. Benn, Connecticut Department of Health Services, 1989, unpublished report).

Expected increases in smoking-related diseases may be especially large for the Puerto Rican subgroup, on the basis of smoking surveys in the New York City area (21,22). It will be important to continue to monitor lung cancer incidence and mortality rates for Hispanics in Connecticut, and other northeastern States, as well as to survey smoking habits in Hispanic subgroups.

Public health workers, however, need not wait for anticipated increases in lung cancer and other smoking-related diseases to plan efforts to reduce the prevalence of smoking in Hispanic populations; such efforts might include the use of culturally appropriate, self-help smoking cessation materials (23). Anticipated increases in smoking-related diseases among Hispanics could be attenuated by effective smoking cessation intervention programs.

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