Cancer in Puerto Rican Women

INTRODUCTION

Any examination of the health status of Puerto Rican women involves looking at two different populations: those living in Puerto Rico and those living in the continental United States. For purposes of this chapter, all women living in Puerto Rico are counted as Puerto Rican women on the island, because 98.7 percent of adults living in Puerto Rico identify themselves as Hispanic or Latino (U.S. Census Bureau, 2001). Puerto Rican women in the United States include all those who self-identified as Puerto Rican in the 1990 U.S. Census, hospital records, and other surveys.

Although the genetic endowment of both groups can be assumed to be similar, other determinants of health—including lifestyles and health behaviors, the environment, and access to health services—can be expected to vary. Moreover, there may be factors related to migration (e.g., a “healthy migrant” effect or, conversely, stressors related to the migratory process) that may lead to differences in disease patterns and different exposures to particular conditions. The data presented in this chapter deal with both subgroups, either by representing one group or the other or, whenever possible, by comparing the groups.

BACKGROUND

The population of Puerto Rico has undergone major changes over the past 50 years. During this period, the island was transformed from a rural, agricultural society into a largely urban manufacturing- and service-based economy. Health services were reconfigured and expanded, with public health units, health centers, and secondary and tertiary hospitals organized into a regionalized system that reached into every municipality (Ramírez de Arellano, 1981; Arbona and Ramírez de Arellano, 1978). Health status indicators reflected the socioeconomic, environmental, and medical changes as mortality and fertility rates dropped and the prevailing health problems changed from infectious and parasitic diseases to chronic diseases. The infant mortality rate decreased from 113 to 13 per 1,000 live births between 1940 and 1990, and the overall mortality rate dropped from 18 to 7.4 per 1,000 inhabitants. As a result, average life expectancy rose dramatically during the same period, increasing from 46 to 74 years for both sexes and from 45 to 78 for females (Vázquez Calzada, 1988; Departamento de Salud, 1997).

The changes occurring on the island were accompanied by a massive exodus of the population. Although Puerto Ricans, granted U.S. citizenship in 1917, began arriving in the United States early in the 1900s, the size and composition of the migratory flow has varied over time. The migration of Puerto Ricans to the United States can be broken down into three periods. During the first of these, from 1900 to 1945, the "pioneers" arrived (Rodríguez, 1989). The overwhelming majority settled in New York City, establishing communities in East Harlem and other areas of Manhattan, Brooklyn, and the South Bronx.

Following World War II, the "great migration" began. In 1945, 13,500 Puerto Ricans relocated to New York City; in 1946, the number of new arrivals soared to 40,000. By 1948, approximately 260,000 Puerto Ricans were living in the United States, and "New York was in the middle of a mass migration rivaling the great population movements of the first two decades of the century" (Glazer and Moynihan, 1963, p. 93).

The period between 1945 and 1964 generally marks the consolidation of the Puerto Rican presence in the United States. Although the immigrants had higher educational levels than the island population, they were at a disadvantage relative to the U.S. population. In addition to language difficulties, they had less schooling and fewer or inapplicable skills. They also faced discrimination and a constantly shifting labor market; as a result, the newcomers "had to accept whatever jobs were available . . . whatever places were offered to them" (Handlin, 1959, p. 69).

The third phase of migration, between 1965 and the present, has been called "revolving door," "circulating," or even "yo-yo" migration. It has been characterized by marked fluctuations in net migration, as workers travel back and forth between the island and the U.S. mainland in search of economic opportunities (Bonilla and Campos, 1981). At the same time, this period has seen a dispersal of the Puerto Rican population away from New York City. Consequently, although 69.8 percent of all mainland Puerto Ricans lived in New York City in 1960, by 1990 only 33 percent were concentrated in this area (Vázquez Calzada,1988; National Puerto Rican Coalition, 1992). Other cities with important Puerto Rican communities are Newark, New Jersey; Hartford, Connecticut; Chicago; and Philadelphia.

Demographic and Socioeconomic Data

The Puerto Rican population totals close to 6 million, of which 60 percent live in Puerto Rico and the remaining 40 percent in the continental United States. The female population numbers approximately 3 million, and there are about 2 million Puerto Rican adult women. The basic demographic data on the two Puerto Rican populations show that those living on the island tend to be older, more likely to be unemployed, and poorer than their mainland counterparts (see Table 1). The most recent comprehensive data are from the years leading up to 1990, and from the 1990 Census. In terms of distribution by age, those on the island have a higher median age and a proportion more than twice as high in the older age

groups. The sex ratio (number of males per 100 females) is 91.9 for Puerto Ricans on the U.S. mainland and 93.9 for those on the island.

The data on educational attainment indicate that a greater proportion of Puerto Ricans in the continental United States are likely to have completed high school, but Puerto Rico has a higher share of college graduates. Labor force data show that stateside Puerto Ricans have a higher labor force participation rate and markedly lower unemployment than their island counterparts. Still, Puerto Rican males on the U.S. mainland have an unemployment rate that is twice as high as that for the U.S. male population as a whole (Rodríguez, 1989).

The unfavorable labor statistics are in turn reflected in poverty rates. About 33.7 percent of all Puerto Ricans in the continental United States live below the poverty level (see Table 1) compared with 13.0 percent of the U.S. population as a whole (Institute for Puerto Rican Policy, 1990a). Not surprisingly, mainland Puerto Ricans have been described as constituting an underclass made up of “those who are consistently out of the labor force, dependent on welfare, in persistent (often transgenerational) poverty, and somewhat isolated from more mainstream activities” (Rodríguez, 1989, p. 44). Compared with those on the island, however, mainland Puerto Ricans appear to be better off in terms of both jobs and income. Despite vigorous efforts to create jobs and industrialize the island, Puerto Rico suffers from high rates of unemployment and poverty. The median household income is less than three fifths (about 57.6 percent) of that for mainland Puerto Ricans; moreover, it has to stretch further because of larger households on the island. On the other hand, the cost of living is very high in some mainland areas with large Puerto Rican populations (e.g., New York City), so the absolute income advantage appears larger than its net value.

When the data are broken down by sex, the poverty of Puerto Rican women is especially evident (see Table 2). Puerto Rican women everywhere have high poverty rates, but mainland Puerto Rican women are more likely to be heads of households and to be actively employed. They also tend to have higher incomes than their island counterparts. Indeed, their income is virtually the same as that for non-Latina women in the mainland, and this is one of the few areas where parity has been achieved (Institute for Puerto Rican Policy, 1990a).

Health Indicators

Recent analyses of health outcome data on Hispanic subgroups show that the health indicators for Puerto Rican persons are significantly worse than for other Hispanic-origin subgroups. For example, about 21 percent of Puerto Rican persons reported having a physical activity limitation, compared with 14 to 15 percent of Cuban, Mexican, and “other Hispanic” persons (Hajat et al., 2000).

A large proportion of the available data on the health status of Puerto Rican women consists mostly of indicators of reproductive health and AIDS, because this information is routinely collected through vital statistics reporting systems. Table 3 shows that fertility was higher among mainland Puerto Rican women than among their island cohorts in 1990. Further, the proportion of births to Hispanic women in the continental United States rose through the mid-1990s (Matthews et al., 1998). Age-specific birth rates show an interesting pattern: Fertility was higher for mainland Puerto Rican women between ages 15 and 24, and lower between the ages of 25 and 44.

Except for the proportion of higher-order births, which is greater on the island, mainland Puerto Rican mothers have more risk factors than their island counterparts. The statistics on prenatal care and birth outcomes show that mainland Puerto Rican mothers are more than twice as likely as the island cohort to have received late or no prenatal care. This is only partially reflected in birth outcomes. As shown in Table 3, the comparative data indicate that island mothers had a similar proportion of low birth weight babies to that of mainland mothers and a slightly lower percentage of premature babies. However, the infant mortality rate is almost 50 percent higher in Puerto Rico than for mainland Puerto Ricans. Indeed, the rate for mainland Puerto Rican infants is close to the figure for the United States as a whole and does not reflect the relative social and economic disadvantages of the Puerto Rican population vis-a-vis the rest of the country. The difference in infant mortality rates between the island and the immigrant populations is almost entirely the result of the higher neonatal mortality registered in Puerto Rico, where medicine is less technology-intensive (Castro-Alvarez and Ramírez de Arellano, 1992).

The past decade has brought a growing concern about the high incidence of AIDS among mainland Puerto Rican women. Hispanics have been disproportionately affected by AIDS, and Puerto Ricans have the highest incidence among all Latinos. In the United States, the case rate for AIDS is 2.5 times higher for all Hispanics than for non-Hispanic Whites (Díaz et al., 1993). Hispanic women are 7.2 times more likely than their non-Hispanic White counterparts to have the disease (Díaz, 1996).

Among both mainland-born Hispanic women and Puerto Rican-born women living on the mainland, the predominant exposure category (accounting for more than 46 percent of all cases) is injection drug use, followed by heterosexual sex with an injection drug user. Together, these two categories represent approximately 80 percent of all AIDS cases among Puerto Rican-born women in the continental United States (Díaz et al., 1993).

Mortality data for Puerto Rico show that in 1994, AIDS was the fourth leading cause of death for both sexes and the leading cause of death for women between the ages of 25 and 39. Women accounted for 21.9 percent of all deaths attributed to AIDS that year (Departamento de Salud, 1997).

CANCER DATA

Data Limitations

Obtaining epidemiologic data that are specific in terms of sex, ethnicity, and disease requires looking at a wide range of sources and assembling a collage of statistics. In general, the limited availability of health data on Hispanic subgroups has deterred progress in developing appropriately targeted public health policies (Zambrana and Carter-Pokras, 2001). For Puerto Ricans living on the mainland, the data are dispersed (i.e., found in a variety of sources rather than in a central registry), and range from special disaggregations of national data sets to studies examining particular geographic locations or specific cancer sites based on samples. In the case of Puerto Rican women and cancer, data for the island are based on a cancer registry. There also are several comparative studies that have examined cancer rates among Puerto Ricans on the mainland, and then compared those rates with both a standard population of Whites in the United States and with the population of Puerto Rico.

The 11 Surveillance, Epidemiology, and End Results (SEER) registries of the National Cancer Institute have collected case data identifying Puerto Rican ethnicity since 1988. However, these data do not include population estimates, so age-adjusted rates cannot be calculated (NCI/SEER, 2000). Other non-SEER cancer registries in the United States also collect data on Puerto Ricans as a significant Hispanic subgroup (North American Association of Central Cancer Registries, 1996).

Comparative Studies

One of the first comparative studies examined the incidence of cancer in Puerto Rico relative to that in the continental United States for the years 1969 to 1971. Overall, the data showed that age-adjusted cancer rates were 60 percent higher in the U.S. survey areas than they were on the island. Nevertheless, the incidence of cancer was greater in Puerto Rico for cancers of the mouth, pharynx, esophagus, stomach, and cervix (Martínez et al., 1975). Two interesting differences emerged: (1) Whereas in the continental United States the age-adjusted rate of breast cancer ranked number one among women, cancer of the cervix ranked number one among women in Puerto Rico; and (2) in Puerto Rico, the incidence of malignant tumors of the upper alimentary tract (esophagus and stomach) was higher than that of the lower organs (colon and rectum), which is in contrast to the pattern on the mainland (Martínez et al., 1975). This was attributed to differences in eating and drinking habits, and the high consumption of alcohol (including home-brewed “moonshine rum”) on the island (Martínez et al., 1975).

The higher rate of cancer of the cervix among women in Puerto Rico compared with Puerto Rican women on the U.S. mainland varied across life spans. The rates for invasive cancer of the cervix were higher for Puerto Rican women in the United States between the ages of 20 and 30, after which they were

"strikingly higher in Puerto Rico" (Martínez et al., 1975, p. 3269). The most dramatic difference occurred at age 85 when the cervical cancer rate was four times that found in the United States (Martínez et al., 1975).

Another early study looked at mortality related to cancer of the stomach and colon among female and male Puerto Ricans in New York compared with both the population of the United States and that of Puerto Rico between 1958 and 1971 (Monk and Warshauer, 1975). The data for stomach cancer showed that, over time, the death rates "decreased by about one-third for all groups except Puerto Rican-born women in New York City, who showed little change" (Monk and Warshauer, 1975, p. 350). In all instances, the death rate for Puerto Rican women in New York City was lower than that for women in Puerto Rico.

For colon cancer, the 1960 mortality rate for Puerto Rican women in New York City was 8.1 per 100,000 and for women in Puerto Rico, 7.3 per 100,000. By 1970, the rate for New York City Puerto Rican women had increased to 9.5 per 100,000, in contrast with a slight decrease to 7.1 per 100,000 for women on the island (Monk and Warshauer, 1975). Still, Puerto Rican women in New York City had lower rates than other city residents. For both of these types of cancer and for both sexes, survival rates on the mainland were about twice as high as those in Puerto Rico from 1950 to 1960, but the gap narrowed considerably over time; by 1970, survival rates on the island were about 80 percent of U.S. rates overall (Monk and Warshauer, 1975).

The same research team looked at similar data for the years 1975 to 1979. Their survey found a dramatic increase in age-adjusted colon cancer mortality in Puerto Rican-born residents of New York City over a period of 20 years. The magnitude exceeded 200 percent in males and 50 percent in females (Warshauer et al., 1986). However, for stomach cancer, mortality decreased substantially in the groups studied in New York City and in Puerto Rico, and mortality rates for Puerto Ricans in New York City were lower than those for Puerto Ricans on the island. Although the ratio of age-adjusted colon cancer incidence to mortality was about the same in both groups, the incidence-to-mortality ratio for stomach cancer was notably higher for Puerto Ricans in New York City (Monk and Warshauer, 1975).

A more comprehensive examination of cancer mortality data was carried out by Rosenwaike and Hempstead (1991) using 1979-81 data for three Puerto Rican-born populations: those living in Puerto Rico, those living in New York City, and those living in other areas of the United States. They calculated the ratios of the age-adjusted death rates for each group to those of the standard (U.S. White) population for the principal cancer sites. As indicated in Table 4, all three Puerto Rican groups had age-adjusted cancer mortality rates that were significantly lower than those of the standard population. The breakdown

by site revealed that, for some of the major cancer sites (e.g., lung, colon, pancreas, stomach, esophagus, liver, and breast), the Puerto Rican-born group residing in the United States, but outside of New York City, had age-adjusted death rates most similar to those of the standard population and most different from rates of the island population. All three Puerto Rican subgroups had significantly lower rates for lung and breast cancers and significantly higher rates for stomach cancer. For other sites, such as the liver and pancreas, rates for the mainland population groups did not vary significantly from the standard, whereas those of the island population did. Women in Puerto Rico appear to be at particularly lower risk for cancers of the lung, colon, pancreas, and breast, but at much higher risk for liver cancer (Rosenwaike and Hempstead, 1991).

Comparisons among subgroups of Puerto Rican women show that some groups have elevated rates of cancers of the liver and the cervix. Women on the island are significantly more likely to die from cancer of the liver than their mainland counterparts, yet they are at lower risk for death related to cancer of the cervix than Puerto Rican women in the continental United States. Because cervical cancer is amenable to treatment if detected in the early stages, the mortality differentials shown in Table 4 suggest that access to screening and early detection may be easier for women in Puerto Rico than on the mainland.

A comparison between Puerto Ricans in New York City and non-Hispanic White residents of the city similarly found that, in general, the former had lower cancer mortality rates. Low rates of death from cancer among Puerto Rican women were found for cancers of the lung, colon, breast, and ovary. Elevated rates were found for cancers of the esophagus and stomach, which are associated with alcohol consumption and poverty (Shai, 1986).

In contrast to the U.S. population as a whole, Puerto Rican females in New York City with the highest incomes had the highest mortality rates from breast cancer. Non-Hispanic White women had at least twice the breast cancer mortality rate of Puerto Rican women at all income levels, but the differences were greatest among poor women—poor non-Hispanic White women had more than five times the breast cancer mortality rate of poor Puerto Rican women (Shai, 1986).

A more recent study of Puerto Rico-born residents of Long Island, New York, touched on the relationship between cancer incidence and income. This study calculated standardized incidence ratios for the years 1980 to 1986 (Polednak, 1991). Two sets of expected numbers were computed: one based on incidence for all geographic locations in NCI's SEER Program (excluding Puerto Rico), and the other based on incidence rates for Puerto Rico (Polednak, 1991). The study found a slightly (but nonsignificantly) reduced standardized incidence ratio for all sites in females, using the SEER data as a comparison. Only the standardized incidence ratio for stomach cancer was significantly elevated with respect to the

expected rates based on SEER data. When the Puerto Rican rates were used as a reference, however, the observed incidence rates were higher than expected for all sites, except cancer of the cervix. Among females, a significantly higher than expected incidence was found for cancers of the colon/rectum, lung, breast, and uterus. The study attributed the findings to the higher socioeconomic status among the Puerto Rican population of Long Island (compared with that of Puerto Rico), which suggests that "increasing SES may result in changes in environmental factors, such as dietary and sexual-reproductive patterns, leading to increased risks of certain cancers (e.g., uterine corpus and breast) and a reduced risk of cervical cancer" (Polednak, 1991, p. 1407). The explanation of the higher rate for lung cancer may reflect differences in rates of smoking between the Long Island and Puerto Rico populations.

An analysis of SEER data from 1992 to 1998 revealed that Puerto Rican women were more likely to be diagnosed with cancer at the early age of 44 years or younger (18.9 percent) compared with non-Hispanic White women (10.9 percent) (see Table 5). Table 6 shows the number and proportion of cancers by site for Puerto Rican and Non-Hispanic White women. In comparison to Non-Hispanic White women, Puerto Rican women with cancer were proportionately more likely to be diagnosed with cancers of the stomach, liver, and cervix and non-Hodgkin's lymphomas, and less likely to be diagnosed with cancers of the breast, uterus, lung, and skin.

Data for Puerto Rico

The most recent data on the incidence of cancer in Puerto Rico are from the Central Cancer Registry and include data collected through 1989 (Central Cancer Registry, 1991). In 1989, the age-adjusted all-cancer incidence rate for women was 139 per 100,000 compared with 188.5 for men. The rate for women represented a slight decrease (of 4 percent) from the rate for the period 1980-84. Trend data show that the age-adjusted incidence rate peaked at 153.3 per 100,000 from 1970 to 1974, and has decreased since then.

In 1989, more than half (52.9 percent) of all cancers were diagnosed in women younger than 65 years of age; 1.6 percent were diagnosed in females younger than 15. Among women, the highest incidence rates were for cancers of the breast; cervix; colon; uterus; trachea, bronchus, and lung; stomach; rectum; ovary; and for leukemia.

Time trends for the female population show that the incidence rates for cancers of the colon, rectum, breast, uterus, and lung have been increasing, and incidence rates for cancers of the mouth, esophagus, stomach, cervix, and pharynx have been decreasing.

The breakdown by stage at which disease was diagnosed as of 1989 revealed that 9.7 percent were found in situ (confined to the initial site), 36.6 percent were localized (spread to other areas but still located within the primary site), and 44.5 percent were diagnosed at a later stage (extending beyond the primary site). The stage was unknown for the remaining 9.2 percent. The proportion of cases diagnosed early in women decreased between 1980 and 1990, when 53.0 percent of all female cancers were diagnosed as in situ or localized.

In 1989, about 76 percent of all cancers in females were treated—a higher proportion than that for men (67.7 percent). The breakdown by type of initial treatment reveals that 43.0 percent of all patients had surgery, 7.9 percent received radiotherapy, 3.2 percent received chemotherapy, 0.1 percent received treatment with hormones, and 21.8 percent received combined therapy. The remaining 24 percent were not treated. Only 40.1 percent of women diagnosed in 1989 were treated while the tumor was localized at its organ of origin. This percentage was deemed inadequate, but was slightly higher than the corresponding figure for men (35.5 percent). More than three fifths (60.2 percent) of all patients were treated within 1 month of diagnosis. Indicators that assess the management of cancer cases revealed that Puerto Rico lost ground between 1985 and 1989, with five of seven indicators showing some backsliding. Only two indicators—the proportion of cancers diagnosed in situ and localized, and those treated within 1 month of diagnosis—showed slight improvement among women (Central Cancer Registry, 1991).

Survival rates varied widely until 1985 by site and stage of disease, as indicated in Table 7. The overall survival rate for all types of cancer among women living on the island was 72 percent after 1 year, 53 percent after 3 years, and 45 percent after 5 years.

Mortality data for women in Puerto Rico are available until 1997. Table 8 summarizes the most recent mortality data, by age and cancer site. The data show that the age-adjusted mortality rate for all cancers was 69.6 per 100,000 women (National Center for Health Statistics, 2001). Malignancies of the breast, lung/bronchus, and colon were the leading causes of cancer death among women in Puerto Rico through the 1990s.

Overall lifetime risk of breast cancer among women in Puerto Rico has increased since the 1960s, but is lower than the risk for both Black and White women in the continental United States. A recent study of breast cancer patterns estimated the lifetime risk of developing breast cancer among Puerto Rican women at 5.4 percent, compared to 8.8 percent for U.S. Black females and 13.0 percent for U.S. White females (Nazario et al., 2000).

CONTRIBUTING FACTORS

The many risk factors for contracting cancer and the interaction among factors complicate the task of establishing causal links in the process by which a normal cell becomes cancerous. Nevertheless, several contributing factors predispose and condition cancer incidence and mortality, and affect the way in which people perceive and cope with the disease. These factors are grouped under four major categories: lifestyle and health behaviors, access to care, environmental exposures, and health beliefs. The relative importance of these factors can vary over time and place, through the course of a life span, and at different sites and stages of the disease.

Lifestyle and Health Behaviors

The primary prevention of cancer involves both personal and social circumstances. Essential factors include identifying and possibly modifying lifestyle factors, including dietary choices and other personal habits (Wrba, 1988). This section examines smoking, nutrition, extent of physical activity, alcohol consumption, breast-feeding, and reproductive practices.

Smoking. The role of smoking as an etiological factor in cancer can no longer be disputed. Indeed, tobacco alone, or in combination with alcohol, is deemed "the most important cause of cancer, the culprit behind approximately one out of three cancer cases in the United States" (McAllister et al., 1993, p. 275).

Puerto Rican women on the U.S. mainland are less likely to smoke than their male counterparts, but are more likely to smoke than women in other Latina subgroups. Data from the Hispanic Health and Nutrition Examination Survey (HHANES) conducted between 1982 and 1984 showed that Puerto Rican women had the highest smoking rate among Hispanic subgroups at 30.3 percent, compared with 23 to 24 percent among Cuban Americans and Mexican Americans (King et al., 1997). Unlike other Latinas, Puerto Rican women in the younger age groups (20 to 49) are more likely to smoke currently than those in older cohorts (Rogers, 1991).

Vital statistics data also suggest a higher prevalence of current smoking among Puerto Rican mothers compared with other Latinas. Since 1989, birth certificate data have included information on lifestyle and risk factors of pregnancy and birth, including maternal smoking. The data for 1990 indicate that although only 6.7 percent of all Hispanic mothers were smokers, 13.6 percent of Puerto Rican mothers were reported to have smoked during pregnancy (National Center for Health Statistics, 1993b).

The number of cigarettes smoked per day is another indicator of the exposure to the risks associated with smoking. Data from HHANES, which included approximately 76 percent of the Hispanic-origin population

in the United States but excluded the population of Puerto Rico (Delgado et al., 1990), showed that mainland Puerto Rican female smokers smoked an average of 16 cigarettes per day at the time the survey was taken (Rogers, 1991). This was similar to the number smoked by Cuban women but higher than that for Mexican American women.

The data on smoking and level of acculturation also are important because they suggest factors that may have an impact on smoking patterns. HHANES data show that smoking rates among successive cohorts of U.S. Puerto Rican females have increased substantially (from 8.4 percent in 1933 [the 1911-1920 birth cohort] to 38.2 percent in 1983 [the 1961-1970 birth cohort]), with the proportion of cigarette smokers among adolescents being particularly high (Escobedo and Remington, 1989). No other group experienced such a large increase.

There are no comparable large-scale surveys on the smoking habits of Puerto Rican women on the island, but available studies suggest that they tend to smoke less than their mainland U.S. counterparts. A 1982 survey based on a representative sample of 3,175 women aged 15 to 49 living in Puerto Rico found that 15.3 percent were current smokers (Becerra and Smith, 1988). Smoking prevalence varied by the place where the women were raised: 25.4 percent of the women raised on the mainland were current smokers compared with 14.5 percent of those who were raised on the island. Again, acculturation to U.S. lifestyles appears to be associated with smoking.

Nutrition. Diet and nutrition have been implicated in the incidence of several cancers (Hirayama, 1988). The influence of food consumption patterns is striking in cancers of the digestive organs and also is evident in so-called smoking-related cancers. Different lifestyle components may interact with each other, thereby confounding the effects of particular etiological factors. It has been estimated that diet modification could bring about a 35 percent reduction in cancer deaths (McAllister et al., 1993). A recently reported, small case-control study of the dietary patterns of breast cancer patients in Puerto Rico found a positive nonsignificant relationship between dietary fat intake and postmenopausal breast cancer (Santiago et al., 1998).

The relatively high incidence of cancers of the esophagus and stomach among Puerto Rican women suggests the importance of examining food consumption patterns as an etiological factor. Data on the nutritional habits of Puerto Ricans in the continental United States primarily are based on the findings of HHANES. HHANES found that, in all three Hispanic subgroups (Cubans, Mexican Americans, and Puerto Ricans), the age-adjusted prevalence of being overweight was higher for women than for men. More than two fifths (40.2 percent) of the Puerto Rican women in the sample were overweight, compared

with 23.9 percent of non-Hispanic White women and 44.4 percent of non-Hispanic Black women (Fanelli-Kuczmarski and Woteki, 1990).

Although some of the data from Puerto Rico are incomplete or outdated, they nevertheless provide an indication of trends that need to be monitored and reversed. The most recent comprehensive surveys of eating patterns on the island were conducted in the mid-1970s (Fernández, 1975). The study subjects were a representative sample of the Puerto Rican population (Fernández, 1975, p. 3276). Data were collected from interviews with 877 families and clinical, anthropometric, biochemical, and parasitological studies on a subsample of 142 families.

These studies found that food consumption patterns in Puerto Rico between 1950 and 1973 had changed from those reported in previous surveys. Particularly dramatic were the increases in the per capita consumption of milk (from 133.4 to 296.6 pounds), beef and veal (from 13.7 to 38.8 pounds), and eggs (from 8.8 to 21.3 pounds); green vegetables (from 52.6 to 86.5 pounds); and processed fruits (from 16.0 to 38.3 pounds). Similarly, between 1956 and 1973, per capita consumption of coffee rose by 31 percent, and the intake of spices (such as garlic and vinegar) increased by 89.3 percent (Fernández, 1975). At the same time, the intake of starchy vegetables and legumes decreased by approximately 33 percent, and that of fresh fruit dropped by almost 6 percent (Fernández, 1975). The net effect of many of these changes was “a definite and marked reduction” in the average amount of fiber in the Puerto Rican diet, a change that may be associated with an increase in the incidence of bowel cancer (Fernández, 1975, p. 3289).

The Fernández studies found a high prevalence of obesity, particularly among women. Approximately 28 percent of the women older than 19 years of age were found to be more than 20 percent overweight on the basis of height, weight, and skinfold thickness. Women between ages 40 to 59 had the highest prevalence of obesity, 38 percent. Because women make most key decisions concerning food buying, preparation, and consumption, they are instrumental in shaping the food habits of their families. It is therefore not surprising that 22 percent of the children surveyed also were found to be obese.

Obesity was more common in urban families and was more common with increased income; it therefore appears to be a problem of affluence. Interestingly, both excess weight and a higher prevalence of signs of nutritional deficiency were found among the higher income groups. Members of these groups were more likely to have adopted a high-fat, low-fiber diet and to have relegated staples such as legumes, starchy vegetables, and fresh fruit to an inferior status.

Extent of Physical Activity. In adults, physical activity is suggested to lower overall cancer incidence and mortality rates and to have the strongest beneficial impact on colon cancer (Thune and Furberg, 2001). Prevalence estimates for physical activity have not been published for Puerto Ricans. National data sets provide physical activity prevalence estimates for Hispanics (Jones et al, 1998; Macera and Pratt, 2000; U.S. Department of Health and Human Services [USDHHS], 1996). Prevalence of inactivity is higher among Hispanic women and fewer Hispanic women meet the current physical activity recommendation (Jones et al, 1998; Macera and Pratt, 2000; USDHHS, 1996).

Alcohol Consumption. Alcohol increases the risk of cancers of the mouth, pharynx, esophagus, and liver, and has been linked to cancers of the colon, rectum, and breast (McAllister et al., 1993). Data from HHANES show that Puerto Rican women on the mainland are more likely to be current drinkers than their Cuban counterparts, but are less likely to drink than the equivalent Mexican American cohort (Rogers, 1991).

HHANES respondents were asked to report on their consumption of beer, wine, and liquor (Rogers, 1991). More than half of the Puerto Rican female drinkers on the mainland drank beer; 43 percent of women aged 20 to 44 drank three or more beers per day. Among women 45 to 74 years old who drank, the average number of beers consumed per day was 2.4 (Rogers, 1991). Wine consumption also was high among women who drank; the average number of glasses per day was 2.1 and 1.3 among those 20 to 44 and 45 to 74 years of age, respectively. Of all the Latino subgroups in the United States, Puerto Ricans of both sexes have the highest levels of liquor consumption. Puerto Rican women respondents who drank alcohol reported consuming, on average, almost four drinks of liquor per day, a level that exceeded that of Mexican American and Cuban males (Rogers, 1991).

Comparable data for Puerto Rico are not available, although there is ample documentation of the overall high consumption of alcohol on the island. Indeed, one study suggested that “the island probably has the highest per capita consumption [of liquor] in the world” (Fernández, 1975, p. 3288). In 1970, the average Puerto Rican of drinking age consumed 2.94 gallons of hard liquor (equivalent to 1.26 gallons of absolute alcohol) over the course of the year (Fernández, 1975). Although there are no recent data on this subject, the consensus is that the situation is worsening, as reflected by increases in the number of deaths caused by homicide, motor vehicle accidents, and cirrhosis of the liver (Morales del Valle, 1991). However, there are no reliable gender-specific statistics on alcohol consumption on the island.

Breast-feeding. Prolonged breast-feeding has been recognized as protecting against the risk of breast cancer. Data from HHANES (1982-84) showed that among those Puerto Rican women who had given birth in the preceding 12 months, only 1.5 percent reported currently breast-feeding (Stroup-Benham and

Treviño, 1991). This was significantly lower than the corresponding rate for Mexican Americans (17.2 percent) and slightly lower than that for Cuban women (1.9 percent). Data indicate that breast-feeding in Puerto Rico declined between 1946 and 1974, then rose after that. The proportion of babies who were breast-fed (any breast-feeding) was 59.3 percent for those born before 1960, dropped to 25.1 percent for those born between 1970 and 1974, then rose to 38.3 percent for infants delivered between 1980 and 1982. At the same time, the mean duration of breast-feeding decreased steadily, from 7.8 months before 1960 to 3.4 months for births between 1980 and 1982 (Becerra and Smith, 1987).

The same study found that female infants of women raised in Puerto Rico were more likely to be breast-fed (39.4 percent) than female infants of women raised in New York City or other parts of the United States (25.2 percent). This study also found that island mothers with a higher level of education (12 or more years) were more likely to breast-feed their infants than those with less schooling, and that the average length of time for breast-feeding tended to decrease with less maternal education (Becerra and Smith, 1987).

Reproductive Practices. The relationship between reproductive practices and certain types of cancer has been the subject of many studies. Because of the particular reproductive patterns of Puerto Rican women, three specific practices are described here: sterilization, sexual abstinence, and contraception.

Sterilization—Probably the most salient reproductive characteristic of Puerto Rican women is the high prevalence of sterilization. Indeed, for at least the past 20 years, Puerto Rican women on the island have had the highest rate of sterilization in the world (Warren et al., 1986). The practice has a long history on the island (Ramírez de Arellano and Seipp, 1983). Tubal ligations, which were provided in hospitals beginning in the 1930s, had become the contraceptive method of choice by the mid-1960s; in 1965, almost one third of all ever-married women between the ages of 20 and 49 were found to be sterilized (Presser, 1973). The proportion had risen to 42.6 percent by 1982 and has since risen to as high as 80 percent among cohorts older than 44 years of age (Warren et al., 1986).

The practice also is common among Puerto Rican women in the continental United States. Data from HHANES found that 23.0 percent of Puerto Rican women aged 15 to 45 had been sterilized; this was significantly higher than the proportion among other Latinas (Stroup-Benham and Treviño, 1991). Other studies have confirmed the high rate of female sterilization among mainland Puerto Ricans. The New York Fertility Employment and Migration (NYFEM) Survey of 1985 studied Puerto Rican women aged 15 to 49 living in 10 counties in the New York City area. The percentage of women in these age groups who were sterilized was 30 percent, more than twice the rate of all women in the United States (Salvo et al.,

1992). The same survey also found that currently married Puerto Rican women who were island-born were much more likely to be sterilized (45 percent) than those who were mainland-born (19 percent). The high prevalence of sterilization among Puerto Rican women has acquired greater importance with the mounting evidence that this procedure may be inversely associated with ovarian cancer. A longitudinal study found that women who had undergone tubal ligation were one third as likely as other women to develop ovarian cancer (Hankinson et al., 1993). At the same time, the trend among Puerto Rican women also may have unfavorable implications for health-seeking behavior. The relative availability and social acceptability of sterilization means that women forego other methods of family planning, opting instead to have several children in quick succession prior to getting a tubal ligation. Moreover, because women go to physicians primarily for conditions related to childbearing, they tend to distance themselves from the medical sector once they are no longer at risk for pregnancy. Because sterilization takes place at a relatively young age (the median age is 27 years for ever-married women in Puerto Rico) (Vázquez Calzada and Morales del Valle, 1982), women may go for many years without receiving gynecological services. They are therefore less likely to receive routine screening for female cancers and may thus be more likely to have conditions that remain undetected until it is too late.

Sexual Abstinence—The 1985 New York Fertility, Employment and Migration (NYFEM) survey found that 52 percent of never-married Puerto Rican women in the sample reported never having had intercourse. However, when the definition of “never married” was modified to include those who had been in consensual unions but not in legal unions, the corresponding proportion of women declined to 25 percent (Salvo et al., 1992).

On the island, more than 90 percent of never-married women reported never having had intercourse. This low level of sexual activity was ascribed both to a “cultural reticence about sex” and to cultural imperatives inhibiting unmarried women from engaging in sexual activity (Salvo et al., 1992, p. 221).

Contraception—HHANES found that 8.7 percent of the Puerto Rican women surveyed (compared with 15.7 percent of the Mexican Americans and 8.2 percent of the Cubans) were using oral contraception (Stroup-Benham and Treviño, 1991). The NYFEM Survey found that 21.7 percent of the Puerto Rican respondents were using a reversible (nonsurgical) birth control method; 9 percent were using the birth control pill (Salvo et al., 1992).

Although these rates of contraceptive use are significantly lower than those for all U.S. women (36.8 percent of whom were using a reversible method of contraception, including 15.6 percent who were using the pill), they are higher than the corresponding figures for Puerto Rican women on the island. In Puerto Rico, 15.7 percent of women 15 to 49 years of age used a reversible method of contraception (Salvo et

al., 1992), and only 5.8 percent used the pill (Herold et al., 1986). Researchers have therefore concluded that in Puerto Rico, “the alternative to sterilization appears to be non-use rather than the use of highly effective temporary methods” of family planning (Warren et al., 1986, p. 359).

Environmental Exposures. Data on environmental exposures to potential carcinogens among the U.S. mainland Puerto Rican women are very limited. As a result, links between specific risks and the incidence of cancer in this population are highly speculative at best. Nevertheless, data on the occupational conditions of Hispanic workers in the United States suggest that members of this group are at increased risk for job-related injuries and illnesses because many occupy the lowest rungs of the occupational ladder and are therefore hired “at low wages, with few benefits, and little health and safety training, and [are] then subject to the hazards of extremely dangerous jobs” (Kotelchuck, 1992).

The rapid industrialization of Puerto Rico has resulted in the growth of a diverse manufacturing sector, creating a variety of potential hazards. The island’s labor surplus also has created a situation in which the pressure for jobs has eclipsed a concern for the exposures to which workers—and the population as a whole—are subjected. As a result, environmental and occupational standards are unevenly and inconsistently applied, and regulations concerning physical risks, pollution, chemical emissions, and worker protection often are overlooked.

A 1980 survey of manufacturing establishments in the San Juan metropolitan area found that almost 80 percent of all the industries had fewer than 100 employees. Although men constituted 60 percent of all industrial employees, women predominated in medium-sized industries employing 51 to 150 workers. The main health hazards found among the industries surveyed were exposure to solvents, excessive noise, toxic particulate matter, and other chemical emissions. The survey also found that most industries lacked occupational health services; as expected, the smaller the operation, the less likely it was to have services and facilities to safeguard the health of workers. The major deficiencies were lack of baseline data concerning the health of the employees, limited or nonexistent surveillance of environmental and other hazards, and lack of medical records (Villafaña and López, 1980).

In the decades from 1970 to 1990, published reports have documented hazards associated with industrial pollution in Puerto Rico. There are, for example, cases of conditions possibly associated with mercury poisoning (García Castro, 1980), premature thelarche (female breast development) possibly linked to animal drugs or food supplements given to beef or poultry (Ramírez de Arellano, 1986), gynecomastia (male breast tissue development) and other sexual changes associated with exposure to hormones in the manufacture of oral contraceptives (Centers for Disease Control, 1977), and dermatological and respiratory problems linked to the manufacture of graphite (Susser, 1985). In the last case, a 1984

National Institute for Occupational Safety and Health investigation found “measurable levels of . . . known carcinogens . . . for which no safe level is now known” (quoted in Susser, 1985, p. 570). Nevertheless, the long latency period for most environmentally caused cancers, the weakness of the labor movement in Puerto Rico, and the fact that many communities are torn between the health hazards that accompany industrial pollution and the poverty that goes with unemployment, have all worked against the control of environmental exposures on the island.

ACCESS TO HEALTH CARE

Health Insurance Coverage

In the Continental United States. The 1982-84 HHANES examined access to care and use of preventive services among the different Hispanic subgroups. The survey found that of all the Hispanic sex subgroups (Cuban, Mexican American, and Puerto Rican men and women), Puerto Rican women were the most likely to have health insurance (82.7 percent), as well as the most likely to have a routine source of care (83.4 percent) (Solis et al., 1990). However, a substantially larger proportion of male and female Puerto Ricans compared with other Hispanic subgroups of both sexes used hospital outpatient clinics and emergency rooms as their usual source of care. Indeed, 26 percent of the Puerto Rican women interviewed reported using these facilities as their regular source of health services (Solis et al., 1990). Because such facilities are designed for episodic care, data suggest that financial and geographic access to services may be insufficient to ensure quality and continuity of care.

More recent data from the 1990 and 1992 National Health Interview Survey (NHIS) suggest that Puerto Rican women were among the least likely of Hispanic subgroups to report having no health insurance (17 percent versus 21 percent for Mexican Americans). Public insurance sources were used by 31 percent and private insurance by 52 percent of female Puerto Rican respondents, and 77 percent said they had a usual source of medical care (Zambrana et al., 1999).

In Puerto Rico. Data for Puerto Rico are based on the Master Sample Survey (also known as *Muestra Básica de Salud*) for 1989, which found that 52.8 percent of all females (versus 50.4 percent of males) had some type of health insurance (Oficina de Estadísticas de Salud, 1992a). The probability of coverage increased with age, rising from 41.3 percent of those younger than 6 years of age to 89.2 percent of those 65 and older (who are largely covered by Medicare). The survey also revealed a steep gradient in the proportion insured with respect to income. Although only 22.2 percent of those with annual incomes of less than $5,000 were insured, the proportion rose to 84.9 percent for those with incomes of $20,000 and higher.

Although having health insurance is a key enabling factor when it comes to accessing health services, the high proportion of Puerto Rican women without health insurance does not necessarily mean that this population is bereft of care. A government-sponsored (by the Commonwealth of Puerto Rico) regionalized network of services on the island provides a health safety net that, although underfinanced and strained, ensures some minimal access to care for all.

Preventive Services

Mammograms and Clinical Breast Exams. Beginning with the studies carried out 20 years ago of the population enrolled in the Health Insurance Plan of Greater New York (Shapiro, 1994), there was increasing evidence that screening can prolong the lives of many women who develop breast cancer. There is now broad consensus that mammography screening can substantially reduce mortality in older women by increasing early detection and leading to successful treatment.

The 1987 NHIS showed that more than three fourths (75.5 percent) of Puerto Rican women on the U.S. mainland who were 40 years and older had never had a mammogram. This compares with 63.1 percent of all U.S. women in the same age group, but is somewhat lower than the corresponding proportions for other Latina women (National Hispanic Leadership Initiative on Cancer, 1991). Unfortunately, there are no comparable data for women in Puerto Rico.

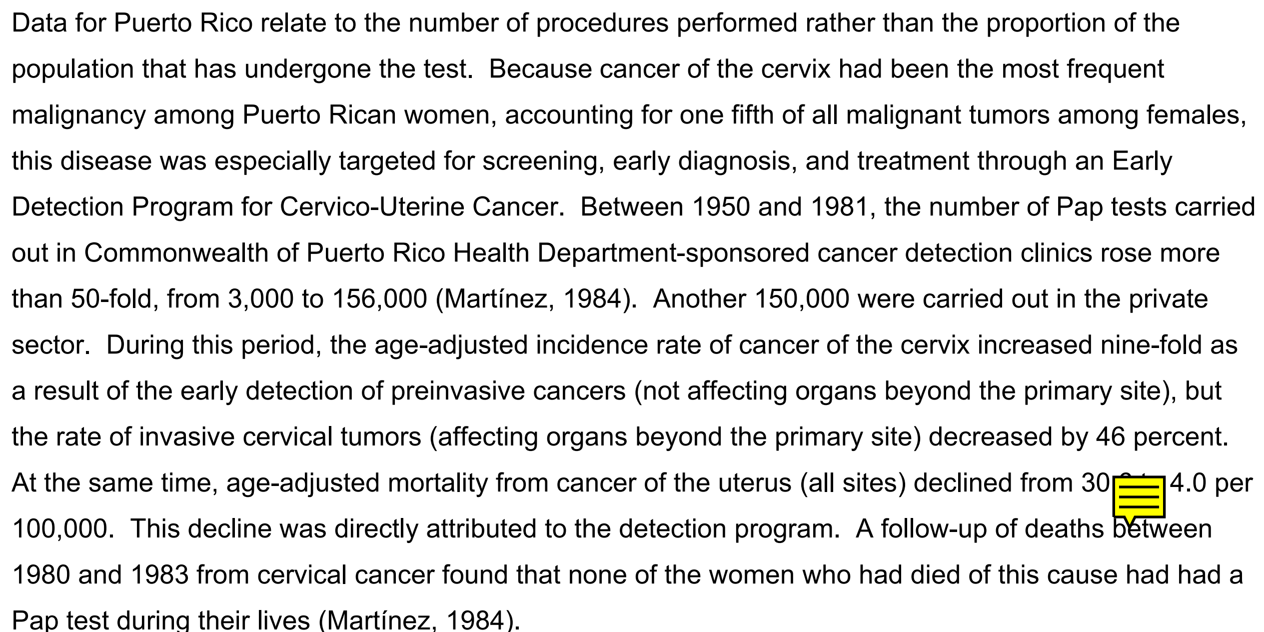
The rates of mammography had increased by the time of the 1990 and 1992 NHIS, with 49 percent of Puerto Rican women over age 50 and 39 percent of those aged 35 to 49 years reporting a mammogram within 3 years. The older Puerto Rican group was second only to Mexican Americans (among Hispanic subgroups) in their use of mammography (Zambrana et al., 1999). Recent data from the *En Acción* survey, which included 224 Puerto Rican women over age 40 from New York, found that they were in the middle among Hispanic subgroups in terms of their use of mammography (Ramirez et al., 2000b).

NHIS data found that 83 percent of responding Puerto Rican women had had a clinical breast exam within 3 years, which was higher than for all other Hispanic subgroups in those surveys (Zambrana et al., 1999). The *En Acción* data also revealed that Puerto Ricans were relatively more likely to have had a clinical breast examination in the preceding 2 years (Ramirez et al., 2000b).

Pap Tests. The high prevalence of cancer of the cervix among Puerto Rican women in the past underscores the need for regular Pap tests. Yet the 1987 NHIS, in which women 18 and older were asked questions about their knowledge of and experience with this screening test, found that Hispanic women in general were substantially less likely than their non-Hispanic counterparts to have heard of a

Pap test or to have had one in the previous 3 years. Fifteen percent of the Hispanic women interviewed did not know what a Pap test was, compared with only 4 percent of Black women and 2 percent of White women. Moreover, only 65 percent of Hispanic women (versus 73 percent of White women and 79 percent of Black women) reported having had a Pap test in the previous 3 years (Harlan et al., 1991).

The breakdown by specific Latina subgroups shows that 15.0 percent of the Puerto Rican women surveyed had never heard of the Pap test and 7.1 percent had heard of the test but had never had one. Yet 77.9 percent had undergone the procedure within the previous 3 years, a proportion comparable to that of all women in the United States (78.6 percent) (National Hispanic Leadership Initiative on Cancer, 1991). More recent data from the NHIS and *En Acción* surveys showed a marked increase in awareness of Pap testing, and approximately the same rate of having the test as was reported in 1991 (Zambrana et al., 1999; Ramirez, 2000a).



Data for Puerto Rico relate to the number of procedures performed rather than the proportion of the population that has undergone the test. Because cancer of the cervix had been the most frequent malignancy among Puerto Rican women, accounting for one fifth of all malignant tumors among females, this disease was especially targeted for screening, early diagnosis, and treatment through an Early Detection Program for Cervico-Uterine Cancer. Between 1950 and 1981, the number of Pap tests carried out in Commonwealth of Puerto Rico Health Department-sponsored cancer detection clinics rose more than 50-fold, from 3,000 to 156,000 (Martínez, 1984). Another 150,000 were carried out in the private sector. During this period, the age-adjusted incidence rate of cancer of the cervix increased nine-fold as a result of the early detection of preinvasive cancers (not affecting organs beyond the primary site), but the rate of invasive cervical tumors (affecting organs beyond the primary site) decreased by 46 percent. At the same time, age-adjusted mortality from cancer of the uterus (all sites) declined from 30.[illegible] to 4.0 per 100,000. This decline was directly attributed to the detection program. A follow-up of deaths between 1980 and 1983 from cervical cancer found that none of the women who had died of this cause had had a Pap test during their lives (Martínez, 1984).

Oral Health. Because many oral cancers are detected by dentists (McAllister et al., 1993), regular dental care is important for screening and diagnosis of oral cancer. Data from the 1982-84 HHANES revealed that 74.8 percent of the Puerto Rican women surveyed reported having had a dental checkup within the 2 years prior to the survey. Another 24.6 percent had let more than 2 years elapse since their previous checkup, whereas only 0.6 percent had never had a dental examination (Solis et al., 1990). Recent use of dental services among mainland Puerto Rican women was higher than that reported for either the Cuban or Mexican American subgroups included in HHANES. Moreover, data suggest that Puerto Rican women on the mainland have better access to oral health services than their island counterparts.

Data from the Puerto Rican annual health interview survey for 1989 (the Master Sample Survey) found that Puerto Ricans make an average of 1.0 visit to a dentist per year (Departamento de Salud, 1992). Females, however, tend to visit a dentist slightly more regularly than males—1.1 visits per year. Of the total visits made by females, more than two fifths (43.3 percent) were for prophylaxis (checkup and cleaning). The figures on time since the previous dental visit indicate that 37.1 percent of all females (compared with 31.9 percent of all males) saw a dentist within the year prior to the survey; another 21.6 percent of females had not seen a dentist in the previous 5 years; and 11.4 percent of females had never been to a dentist (Oficina de Estadísticas de Salud, 1992b). Therefore, there is a significant need for dental care among this 33 percent of the female population in Puerto Rico.

Health Beliefs

Most data on health beliefs concerning cancer are based on surveys of Hispanics in general, and are therefore not consistently broken down by sex or specific subgroups. Yet the available information sheds some light on attitudes and practices with respect to cancer and cancer prevention and provides useful background on self-care and other health-seeking behaviors.

A 1985 American Cancer Society (ACS) study of Hispanics found that cost, language, and discrimination were perceived to be barriers to routine use of health services (Clark, Martire, and Bartolomeo, Inc., 1985). Among mainland Puerto Ricans of both sexes, the perception of discrimination was particularly strong, and was mentioned by 38 percent of those surveyed. Another barrier was more subtle: 41 percent of respondents expressed the feeling that physicians do not care about their patients, an attitude that is likely to condition not only their access to care but also their willingness to accept medical advice. The survey also found that, compared with the other Hispanic subgroups, mainland Puerto Ricans were most concerned with discrimination, were more likely to use clinics, had less rapport with physicians, and were more likely to worry about cancer (Clark, Martire, and Bartolomeo, Inc., 1985).

Although those who were surveyed recognized the value of early detection, problems of access combined with fear kept many from acting on this knowledge. Not surprisingly, the word “cancer” struck fear in the hearts of many surveyed.

The researchers found considerable awareness concerning some of the principal causes of cancer but significant gaps in identifying the early warning signs of cancer. In 1979, the general U.S. population could identify an average of 4.6 of the (then-acknowledged) seven warning signs of cancer, but Hispanics 6 years later mentioned an average of only 3.1 cancer signs. (The seven signs, which are no longer considered to be an accurate/complete summary, were: changes in bowel or bladder habits, a sore that

does not heal, unusual bleeding or discharge, thickening or lump in the breast or elsewhere, indigestion or difficulty in swallowing, obvious change in a wart or mole, and nagging cough or hoarseness.) The Hispanic population in the United States also was less aware of available cancer tests and less persuaded of the effectiveness of cancer treatments. Fear, fatalism, barriers to care, and skepticism concerning therapeutic options make Hispanics a population that should be targeted for health promotion. The survey underscored "the need for a special and separate effort directed at the Hispanic community" (Clark, Martire, and Bartolomeo, Inc., 1985, p. 28).

In the *En Acción* survey results, Puerto Ricans were more likely than Central Americans to believe that they might get cancer and to disagree that cancer can be cured. However, Mexican American women were most likely to have a fatalistic view of cancer over all (Ramirez et al., 2000a).

A recent study of elderly Puerto Rican women on the island was conducted to validate Spanish-language scales of knowledge and beliefs about breast cancer. Scales measuring risk, early detection, symptoms, and beliefs were developed and showed adequate internal reliability and good external validity (Suarez-Perez et al., 1998). Use of these measures in a national survey with a larger sample will provide important information about cancer-related health beliefs of Puerto Rican women (Oliver-Vasquez et al., 1999).

INTERVENTIONS

In the continental United States, efforts aimed at the prevention and early detection of cancer have been targeted at mainly Hispanic women in general rather than at Puerto Rican women specifically. The National Cancer Institute and American Cancer Society (ACS) have prepared health education materials designed to reach out to all Latinas, stressing the need to screen for breast and cervical cancer. Sample publications include "*Un avezal año . . . para toda una vida*" (videotape on breast cancer, breast self-examination, and mammograms), *Tiene 50 años o más*? *Un mamograma podría salvarle la vida*" (brochure), and *"Hágase la Prueba Pap"* (brochure). These materials seek to correct prejudices and misinformation, fill in knowledge gaps, and counteract prevailing fatalistic beliefs regarding cancer and its treatment.

In Puerto Rico, public information messages have been less important than the expansion of services and the targeting of providers who serve women. As described earlier, the Commonwealth of Puerto Rico Health Department's Early Detection Program for Cervico-Uterine Cancer (initiated in 1950) was successful in bringing about a steep decline in the age-adjusted mortality related to cervical cancer (Martínez, 1984). The program reached its maximum effectiveness in the early 1970s when the rate of

Pap tests reached 180 per 1,000 women older than age 15 (Martínez, 1984). However, since then there has been some backsliding, with a consequent decrease in the number and proportion of cancers found in situ (Cancer Control Program, 1993). A recent appraisal of the program's performance found that there was an insufficient number of staff members to perform Pap tests at the primary level or to provide adequate case follow-up; the program also is failing to reach women at higher risk of cervical cancer (Cancer Control Program, 1993).

Efforts to ensure the early diagnosis and treatment of breast cancer have been similarly limited by lack of personnel, inadequate funding, and a limited number of accredited mammography units. Despite these limitations, the Commonwealth of Puerto Rico Health Department operates a structured cancer detection program throughout its 78 health centers, which primarily serve the medically indigent. In addition, the Puerto Rico affiliate of the American Cancer Society (ACS) organizes detection clinics when requested by the community. However, these operate on an ad hoc basis, without a fixed schedule or a consistent location. In conjunction with 20 facilities on the island, ACS also provides mammograms at a reduced price during one month each year (Cancer Control Program, 1993).

In the late 1990s, a 4-year project entitled "Knowledge and Beliefs of Breast Cancer Among Women 65 Years and Over in Puerto Rico" was funded by the U.S. Department of Defense. The project was intended to help design a model for a culturally appropriate health promotion program for older women in Puerto Rico (Oliver-Vazquez et al., 1999). A series of focus groups, followed by a national survey of 500 women aged 65 or older, stratified by socioeconomic level and area of residence, was conducted to help plan the program. This program, based on the health belief model and the PRECEDE/PROCEED model, includes health education for older women, training for primary care providers, and coordination of support services (Oliver-Vazquez et al., 1999). Both process and impact evaluations are planned. This program will provide a valuable model and will yield important new data about the effectiveness of a comprehensive, systematically planned breast cancer detection and education program for older women in Puerto Rico.

The Commonwealth of Puerto Rico Health Department and ACS, among other organizations, also carry out periodic campaigns to reduce specific risk factors. These efforts, usually associated with activities such as smoke-outs, Good Nutrition Week, or Cancer Prevention Month, are aimed at enhancing public awareness of cancer prevention and control.

FUTURE DIRECTIONS

The comparative picture that emerges from the data on cancer and contributing factors among Puerto Rican women suggests a number of areas for improved data resources, research, and intervention.

When Puerto Rican women as a whole have been compared with the rest of the female population of the United States, they were found to have lower incidence and mortality rates for most types of cancer. Although the data are now about two decades old, mortality rates among Puerto Rican women appear to be particularly low for cancers of the breast, lung, and colon. However, Puerto Rican women have higher rates of cancers of the stomach and the esophagus, both of which are associated with dietary habits and the consumption of alcohol. More up-to-date comparison data are essential to see whether these trends have shifted since the early 1980s.

Overall, cancer rates for Puerto Rican women in the continental United States are similar to those for women in Puerto Rico. This is not surprising in view of the common genetic endowment, as well as shared lifestyles and health practices. Nevertheless, there are cancer sites for which the mortality rate varies significantly between the two subgroups; these need further study so that improvements can be made. The patterns for cervical cancer and liver cancer deserve particular attention.

Mainland Puerto Rican women are at higher risk of mortality due to cancer of the cervix than their island counterparts. The dramatic decrease in this type of cancer that occurred in Puerto Rico between 1950 and 1981 provides a good example of the efficacy of targeted interventions aimed at early detection and treatment. This type of effort needs to be sustained, however, if rates are to remain low. Although mainland Puerto Rican women are as likely to have ever had a Pap test as the rest of the U.S. female population, more than one fifth of those eligible in Puerto Rico have never had such a test. This situation is costly in terms of lives. Further, the role of socioeconomic status as a contributor to Pap-test utilization patterns among Puerto Ricans in the mainland should be more closely examined (Zambrana et al., 1999).

The second type of cancer for which there are significant differences in the rates between island and mainland Puerto Rican women is liver cancer. Island women are almost twice as likely to die from this cause as their mainland counterparts. There also is a difference between Puerto Rican women in New York City and those in the rest of the United States, with the latter population having lower rates. These differences indicate an area where epidemiological research is needed. Although the high rate of liver cancer among island women may be associated with alcohol consumption, there are no data to substantiate that there are different drinking patterns among the different groups of Puerto Rican women. What and how women drink may be as important as how much they drink, and qualitative as well as quantitative aspects of alcohol consumption must be taken into account. Again, these data should be updated before they are used as a basis for intervention.

The data on risk factors suggest that even with the overall favorable data for mainland and island Puerto Rican women, enhanced efforts are necessary to control behaviors and circumstances that are linked to the incidence of cancer. Low incomes and traditional female roles appear to have protected many Puerto Rican women from the hazards of smoking. However, smoking among Puerto Rican women on the U.S. mainland is much higher than for other Latina groups (King et al., 1997). The association between acculturation and smoking is a cause for concern. Acculturation has been seen as a way to become part of the U.S. mainstream, and those more acculturated could be expected to have a better command of the English language, greater economic opportunities, and more knowledge of how to negotiate the health care system. However, those who are more acculturated also may adopt unhealthful habits. Hence, adaptation to U.S. customs could be eroding some of the protective factors that previously may have shielded Puerto Rican women against certain types of cancer.

Dietary habits also should be targeted in cancer prevention efforts. The increase in the proportion of overweight women and the association between rising incomes and inadequate diets suggest that traditional Puerto Rican foods have been replaced by less healthful alternatives. The shift toward a high-fat, low-fiber diet, combined with a more sedentary lifestyle, has resulted in unprecedented levels of obesity along with its attendant risks.

Finally, the link between environmental exposures and cancer needs to be studied further. This research should focus on workplace exposures of female Puerto Ricans on the mainland (for example, domestic or laundry work) as well as on environmental toxins in concentrated Puerto Rican neighborhoods in the mainland and throughout Puerto Rico. The search for proximate causes and the identification of individual behaviors must be accompanied by a broader examination of etiological factors that explain trends and variations in the epidemiology of cancer among Puerto Rican women, both in the continental United States and on the island of Puerto Rico.

CONCLUSION

Data on cancer among Puerto Rican women on the U.S. mainland are limited and inconsistent, due to a variety of methodological and practical constraints (North American Association of Central Cancer Registries, 1996). If Puerto Rican women are to be considered an important focus of targeted health education and cancer prevention efforts, better information about their cancer incidence, mortality, and survival rates is needed.