

Preventative Measures

Assessing the Incidence & Mortality of Breast Cancer in Massachusetts

Overview

Between 2002 and 2006 invasive breast cancer accounted for nearly 15% of all cancer-related deaths and approximately 28% of all newly-diagnosed cancer cases among women in Massachusetts. While the mortality rate has decreased significantly over time, the incidence of breast cancer in the Massachusetts remains higher than the national average. Furthermore, although the incidence of breast cancer is highest among Caucasian women in Massachusetts, the mortality rate is highest among African-American and Hispanic women. These statistics cohere with study results and findings of the American Cancer Society and social scientists alike that suggest that cancer-related deaths are most prevalent among American minority women.

Female Cancer Incidence Rates in Massachusetts—per 100,000 people

	White, Non-Hispanic	Black, Non-Hispanic	Asian, Non-Hispanic	Hispanic
1	Breast Cancer 136.8	Breast Cancer 112.2	Breast Cancer 75.5	Breast Cancer 88.8
2	Bronchus & Lung 66.9	Bronchus & Lung 49.8	Colon/Rectum 34.2	Colon/Rectum 34.8
3	Colon/Rectum 46.4	Colon/Rectum 44.2	Bronchus & Lung 30.8	Corpus Uteri & Uterus, NOS 24.3
4	Corpus Uteri & Uterus, NOS 30.2	Corpus Uteri & Uterus, NOS 21.8	Thyroid 25.5	Bronchus & Lung 21.6
5	Melanoma of Skin 20.7	Thyroid 15.7	Corpus Uteri & Uterus, NOS 17.3	Thyroid 19.4

Source: *Cancer Incidence and Mortality in Massachusetts 2002-2006: Statewide Report* published by the Bureau of Health Information, Statistics, Research, and Evaluation and the Massachusetts Department of Public Health (2009: pg 43).

The purpose of this project is to analyze cancer statistics compiled by the Massachusetts Cancer Registry and overlaid onto spatial and demographic data taken from the 2000 census and Massachusetts Geographic Information Systems (MassGIS). From this information, it is possible to determine the areas where breast cancer incidence and mortality are most prevalent. It is also possible to draw conclusions about possible shared demographic and spatial characteristics of these places and to use this information to determine what, if any strategies of awareness and prevention may be implemented most effectively.

Methodology

The Massachusetts Cancer Registry, the Massachusetts Executive Office of Health & Human Services, and the National Cancer Institute compile and make publically available cancer incidence and mortality data for Massachusetts. Much of the initial research for this project consisted of reviewing all the information made available by these agencies and compiling breast cancer-specific datasheets based on the findings and published reports of incidence and mortality rates by county and EOHS region in Massachusetts. Where possible, incidence by city/town was also compiled and mapped.

Those datasheets were then imported into GIS as data layers and joined with 2000 census tables (available at uscensus.gov) and town and EOHS region tables (available at MassGIS). This procedure allowed for incidence and mortality to be mapped by region/county. That information was then laid over/compared to county demographic characteristic maps. To fully illustrate specific demographic qualities within the selected county, additional data was mapped by census tract. In this way, conclusions may be drawn about the areas where cancer incidence and mortality are highest among minority populations, even without being able to map by census tract the exact occurrence of cancer.

FIGURE 1: Regional Incidence & Mortality at a Glance

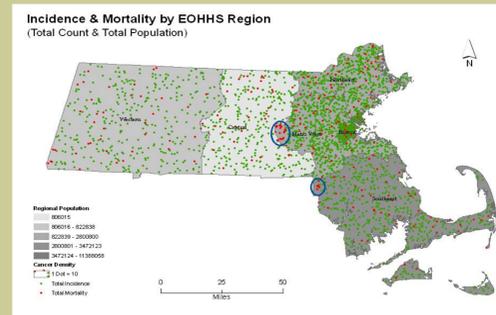


Figure 1 illustrates both the population density across the 6 EOHS Regions as well as the distribution of cancer incidence and mortality throughout each region.

FIGURE 2: Regional Incidence & Mortality by Ethnicity

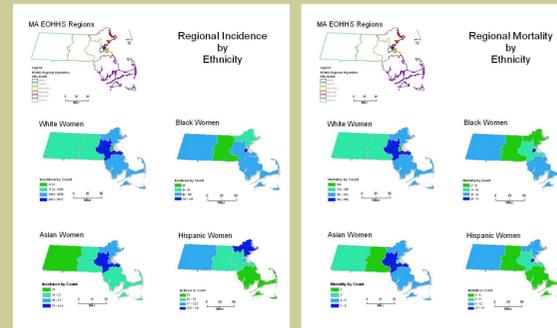


Figure 2 illustrates the density of incidence and mortality in each region by ethnicity. It is worth noting that both incidence and mortality rates, for Black and Hispanic women are highest in the Boston Region (Suffolk County). Whereas the incidence and mortality rates are highest for Asian and White women in the Metro West Region.

FIGURE SERIES 3: Suffolk County Demographics

Figure 3a: Incidence & Mortality by Ethnicity

over Total Population Distribution

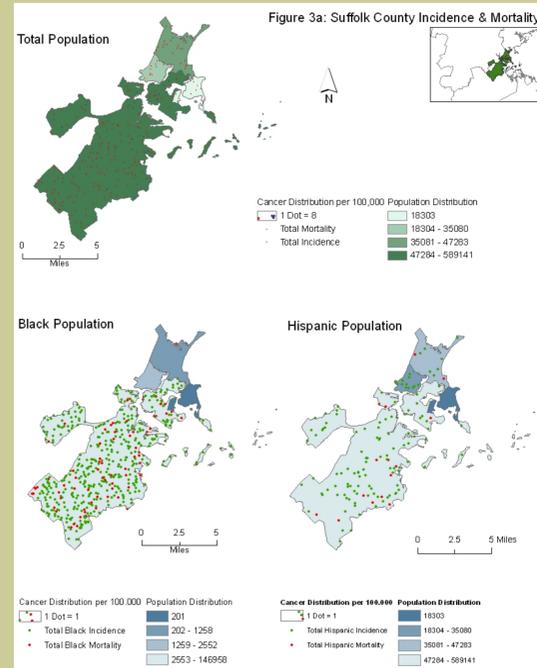


Figure 3d: Income Distribution by Census Tract

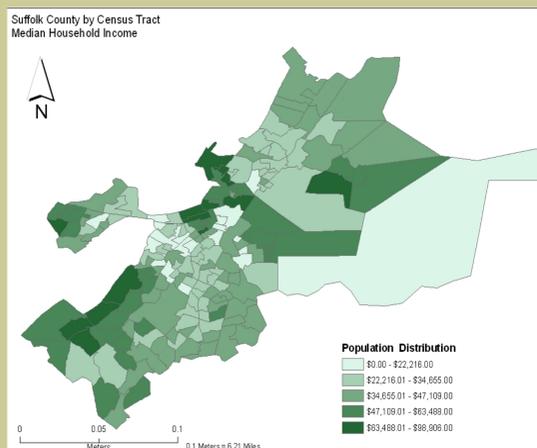


Figure 3b & 3c: Population Distribution by Census Tract

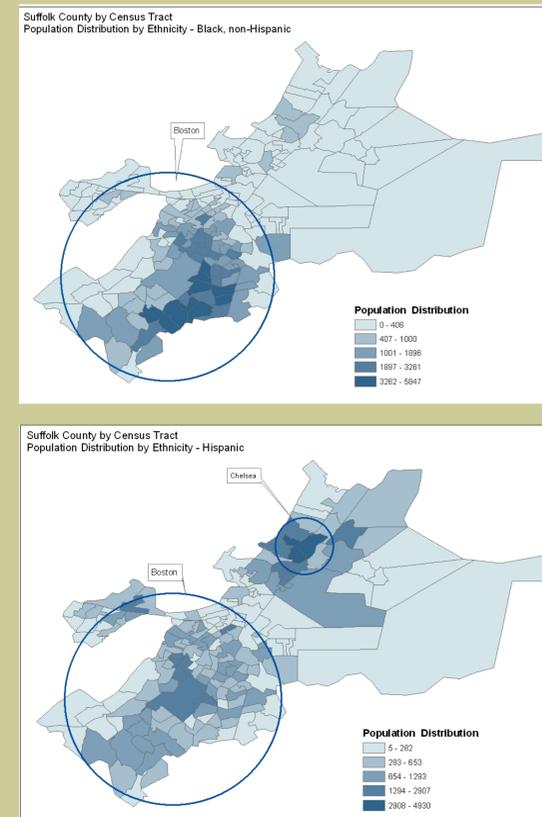


Table 3.1: Total Count—Incidence & Mortality by Ethnicity

INCIDENCE	Total	White, non-Hispanic	Black, non-Hispanic	Asian, non-Hispanic	Hispanic
BOSTON	1,800	1,379	434	59	103
CHELSEA	86	65	n/a	n/a	12
REVERE	190	175	n/a	n/a	7
WINTHROP	77	74	-	-	-

MORTALITY	Total	White, non-Hispanic	Black, non-Hispanic	Asian, non-Hispanic	Hispanic
BOSTON	205	117	72	2	13
CHELSEA	8	8	-	-	-
REVERE	23	20	1	-	2
WINTHROP	6	6	-	-	-

Key Findings

- 1. MA Breast Cancer Rates are High:** Invasive breast cancer is the most prevalent type of cancer in Massachusetts women of all ethnicities. Nationally, 117.7 women per 100,000 are diagnosed each year. In Massachusetts, 130.1 women per 100,000 are diagnosed each year. Between 2002 and 2006 there were over 25,000 new diagnoses and between 2004 and 2006 there were nearly 3,000 breast cancer deaths in the state.
- 2. Rates Among Women of Color are on the Rise:** Since 2001, the rate of incidence in White, non-Hispanic women has decreased; but, incidence has risen in Black, non-Hispanic women and Asian women during the same period. Also since 2001, the mortality rate in Hispanic women has increased from 12.5 per 100,000 women to 14.0 per 100,000 women.
- 3. Relationship Between Spatial Distribution & High Cancer Rates Exists:** Rates are highest in the more densely populated areas in the state. Total breast cancer incidence and mortality are highest in Northeast, Metro West, and Southeast MA. Among minorities incidence and mortality are highest in the Boston Region and Western MA—areas with large areas of minority populations. In Boston alone, minorities account for 27% of breast cancer incidence and 35% of breast cancer mortalities between 2002 and 2006. This spatial relationship is illustrated on a regional level in Figures 1 & 2, and on a specific county level in Figure series 3.

Conclusion

While breast cancer incidence and mortality rates are disproportionately higher among minority women in the state, exceptional disproportion exists in Suffolk County. Spatially it makes sense that the highest proportion of incidence and mortality are found in the county with the largest Black population, and a large Hispanic population. However, there are additional demographic characteristics that may also be affecting health outcomes. The most notable correlation is that between health disparities and income disparity/level of poverty. As illustrated in Figure Series 3 some of the poorest communities (median income < \$22,200) are also home to large populations of Blacks and Hispanics. In Boston, for example, 25% and 10% of the population is Black or Hispanic respectively. 22% of the Black population and 43% of the Hispanic population lives below the poverty line. Boston comprises the largest city in Suffolk County. It is also where the largest concentration of incidence and mortality is traced (See Figure 1).

Furthermore, the increase in incidence among Asian women and Black women that occurred between 2001 and 2006 may be attributed to enhanced screening techniques and public outreach. However, despite such efforts mortality rates in Hispanic women have increased and in Asian and Black women they occur at a higher rate per 100,000 than White women. Thus, awareness campaigns and prevention initiatives do not appear to have adequately addressed mortality once the cancer has been detected. Based on these findings, and given the demographic characteristics of Suffolk County, it has been concluded that high rates of poverty and limited access to medical resources promote high rates of mortality among Black and Hispanic women there. It is my recommendation that in addition to promoting healthy living as the focus of its Comprehensive Cancer Prevention and Control initiative, the Massachusetts Department of Public Health and its partner organizations, place greater emphasis on outreach and accessibility to treatment for patients in low-income communities.

Cartographer: Eugenia T. Gibbons

Final Project: CEE—194: Introduction to GIS

June 26, 2009

Map Coordinate System and Projection: NAD 1983 Stateplane Massachusetts Mainland FIPS

Data Sources: MassGIS, US Census Bureau, Massachusetts Cancer Registry (MCR), Massachusetts Department of Public Health (MDPH), National Cancer Institute Surveillance Epidemiology and End Results (SEER)

