

UPDATE ON CANCER INCIDENCE IN THE BROOKHAVEN LANDFILL AREA

CENSUS TRACTS 1591.03, 1591.06, 1592.03, 1592.04, AND 1593.00 TOWN OF BROOKHAVEN, SUFFOLK COUNTY, NEW YORK, 1997-2016

BACKGROUND

In 2005, the New York State Department of Health completed an investigation of cancer incidence near the Brookhaven Landfill. That investigation was initiated due to residents' concerns about the possible adverse effects of the landfill on the health of people living in the surrounding community. Parents of children attending the Frank P. Long (Hampton Avenue) School expressed particular concern. The investigation examined cancer occurrence among residents living in the area served by the school. Cancers diagnosed between 1983 and 1992 were examined first and the analysis was then updated for the period 1993 through 1996. The investigation did not find a statistically significant difference in numbers of cases of cancer among men or women for all sites of cancer combined or for any specific anatomic site of cancer for the period 1983-1992. The update for the period 1993-1996 showed significant excesses in the numbers of cases of bladder cancer and malignant melanoma of the skin in men and uterine cancer in women. The report on the 2005 cancer study and two other evaluations of possible health risks related to the landfill may be found at https://apps.health.ny.gov/statistics/environmental/public_health_tracking/tracker/#/CEHMap.

Since the original cancer investigation was completed there have been renewed concerns about the landfill, specifically concerns about odors and air quality issues. More information about the more recent odor complaints and the steps taken by the New York State Department of Environmental Conservation and the Town of Brookhaven to address them may be found at <https://www.dec.ny.gov/public/111038.html>. As a result of these concerns, in July 2017, the Suffolk County Health Commissioner requested an update of the previous study for bladder and uterine cancers. This report presents the results of the investigation of bladder and uterine cancers among people living near the Brookhaven Landfill for the period 1997-2016.

METHODS

Study Plan. Small area studies are designed to determine whether the number of cases of cancer occurring among people residing in the study area is unusual. To do this, the number of cases of cancer diagnosed among residents of the study area is compared with the number of cases of cancer one would expect to find if rates of cancer in the study area are the same as in similar areas of the state.

Study area and time period. The area chosen for this study was Suffolk County Census Tracts 1591.03, 1591.06, 1592.03, 1592.04, and 1593.00 (see map). This is the same as the area included in the original cancer investigation. Cancer cases were included in the study if they were diagnosed between the years 1997 and 2016. The average population of this area over this 20-year time frame was 23,309 persons.

Identifying Cases (Observed). Residents of the study area who were diagnosed with cancer during the time period of the study were identified from the New York State Cancer Registry. As required by New York State law, the Cancer Registry contains information on all individuals diagnosed with cancer in the state. The Registry receives this information from hospitals, laboratories, physician practices, death certificates, and various other sources. Cancer Registry files are continuously updated, and all the information received is combined to reflect the most accurate and complete information available.

Calculating Expected Cases (Expected). To determine if the number of residents diagnosed with cancer in the study area is unusual, the Department of Health Cancer Surveillance Program calculated the number of cancers that would be expected in the area. This calculation accounts for the population size and the age and sex distribution of the study area. The expected number of cases is calculated by applying cancer incidence rates by age and sex for a reference area, New York State, excluding New York City, to the estimated population of the study area by age and sex. For this study, the numbers of cancer cases expected were also adjusted for race and ethnicity because of differences in racial and ethnic composition between the study area and the reference area. The population of the study area was estimated using data from the United States Census.

Types of Cancer (Anatomic Sites) Studied. For this study, the Cancer Surveillance Program examined bladder cancer among men and women and uterine cancer among women.

Statistical testing. The actual number of cancers diagnosed in the study area was compared to the expected number of cancers. If the probability of observing an excess or deficit was 0.025 (2.5%) or less, based on the Poisson distribution, the result was considered statistically significant. Non-significant excesses or deficits were considered to represent random variations in observed patterns of disease.

Study Limitations. There are some things that should be kept in mind when looking at a study of this type. First is the power of the statistical test. In an area that has few cancer cases, it is difficult to detect an unusual difference between the number of cancers observed and the number expected. A large number of observed or expected cancers is required in order to determine whether the observed number is statistically different from the expected number. The ability to detect this difference is called statistical power. The power of the statistical test is the probability that a true departure from the expected number can be detected by significance testing. The power varies with the number of expected cases. For example, using the statistical test described here, the probability of detecting a true doubling in cancer incidence over the expected value will be 80% or higher when the expected number of cases is 12 or more. For this investigation, the power of detecting a doubling, if one were present, was sufficient for men and women diagnosed with bladder cancer, and for women diagnosed with uterine cancer.

Another limitation is migration. Migration is the movement of people in or out of the study area. Cancer cases were identified among persons who resided in the study area when their cancers were diagnosed. Former residents of the study area who moved away prior to being diagnosed

with cancer could not be included, while persons who developed cancer shortly after moving into the area were included. Therefore, migration influences the ability to determine if living in the study area increases or decreases an individual's risk of getting cancer.

FINDINGS

Results for the period 1997-2016 are presented in the attached table. The number of men diagnosed with bladder cancer was higher than expected but the difference was not statistically significant. The numbers of women diagnosed with bladder cancer and uterine cancer were both close to the numbers expected.

Numbers of cases of bladder and uterine cancers were also examined for four separate five-year time periods (1997-2001, 2002-2006, 2007-2011, and 2012-2016), but are not shown in the attached table. The numbers of men and women diagnosed with bladder cancer and women diagnosed with uterine cancer were not significantly different from the numbers expected in any of the five-year time periods.

INTERPRETATION

This investigation found no statistically significant differences between observed and expected numbers of bladder and uterine cancers in the study area in the period 1997-2016.

It is important to remember that this type of study cannot answer why the incidence of certain cancers in an area may be high. These studies can only show cancer patterns. For any substance to effect human health, people must come into contact with it. This is what is known as exposure. People may be exposed to a chemical substance by breathing it in (inhalation), consuming it in food or water (ingestion), or getting it on their skin (dermal exposure). Even with exposure, not all hazardous substances cause cancer. The risk of developing cancer upon exposure to a cancer-causing substance depends on the amount of the substance people are exposed to, the length of time they are exposed to it, and how often they are exposed to it. This type of study cannot determine whether any of the people with cancer had any exposures that were associated with the Brookhaven Landfill.

Scientific reviews of environmental exposure information in the vicinity of the Brookhaven landfill^{1,2} do not suggest any unusual exposures to chemicals that have been linked to bladder and uterine cancers. Uterine cancer has no known environmental risk factors; all known risk factors for uterine cancer are related to individual characteristics or behavioral risk factors. Although scientific studies have identified occupational, environmental, genetic, and behavioral risk factors for bladder cancer, people who smoke have more than twice the risk of getting cancer as non-smokers.

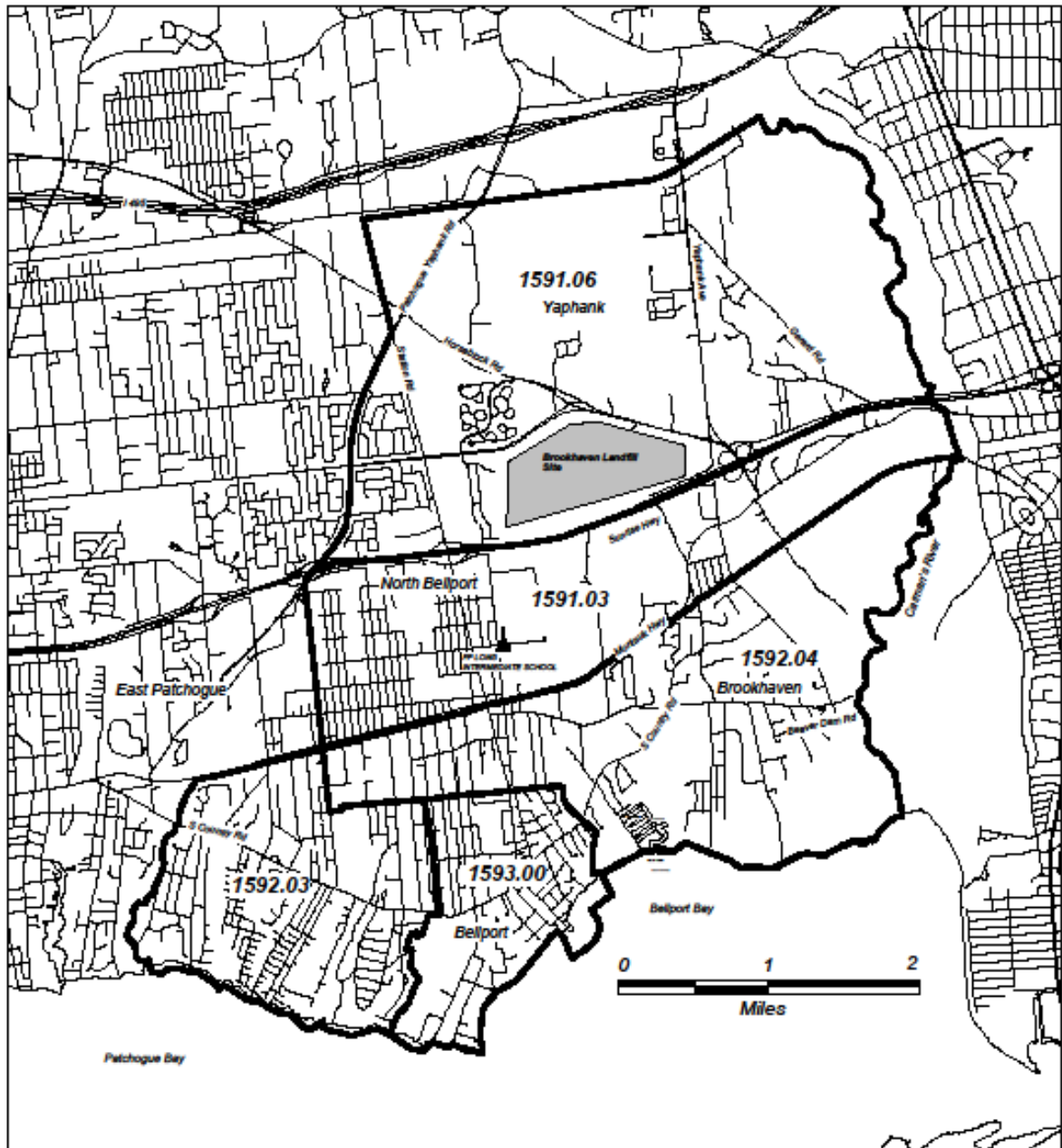
¹ ATSDR (Agency for Toxic Substances and Disease Registry). 2005. Health Consultation. Brookhaven Landfill. Available online: <https://www.atsdr.cdc.gov/hac/pha/brookhavenlandfil112905/brookhavenlandfillhc112905.pdf>

² ATSDR (Agency for Toxic Substances and Disease Registry). 2009. Letter Health Consultation. Brookhaven Landfill Petition. Available online: <https://www.atsdr.cdc.gov/HAC/pha/BrookhavenLandfillPetition/BrookhavenLandfillLHC09-30-2009.pdf>

CONCLUSIONS

The previously found statistically significant excesses in bladder and uterine cancers did not continue in the update period 1997-2016. No further investigation is warranted at this time.

BROOKHAVEN LANDFILL STUDY AREA
CENSUS TRACTS 1591.03, 1591.06, 1592.03, 1592.04, AND 1593.00
TOWN OF BROOKHAVEN, SUFFOLK COUNTY, NEW YORK



**BUREAU OF CANCER EPIDEMIOLOGY
NEW YORK STATE DEPARTMENT OF HEALTH**

Observed and Expected Numbers of Incident Cancer Cases,
Brookhaven Study Area
Census Tracts 1591.03, 1591.06, 1592.03, 1592.04, and 1593.00
Town of Brookhaven, Suffolk County, New York, 1997-2016
New York State exclusive of New York City Standard

SITES (ICD-O-3) ^a	MALES		FEMALES	
	Observed ^b	Expected ^c	Observed ^b	Expected ^c
Bladder (including in situ)	105	90	30	31
Corpus Uterus / Uterus NOS			81	77

^aClassification of site is based on ICD for Oncology, 3rd Edition.

^bData were obtained from the New York State Cancer Registry (database as of September 2019).

^cExpected numbers are based on standard cancer incidence rates by age, sex, race and ethnicity for New York State, exclusive of New York City. Standard rates are applied to the 1997-2016 study population by five-year time periods (total of 233,781 males and 232,391 females) to obtain expected numbers of cases.